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# **THE RELATIONSHIP BETWEEN ANNUAL EARNINGS AND SHARE RETURNS ON THE JSE SECURITIES EXCHANGE**

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# ABSTRACT

This research study investigates whether the relationship between accounting earnings and share returns observed predominantly in New York Stock Exchange (“NYSE”) studies also holds on the modern-day JSE Securities Exchange (“JSE”). Since the JSE is a relatively small stock exchange in comparison to the NYSE, with substantially different characteristics, the nature of the relationship may differ between the two exchanges.

The study finds empirical evidence that this relationship between earnings and share returns is the same. As on the NYSE, accounting earnings disclosures in South Africa are found to have significant information content. Evidence is obtained which shows that accounting earnings do capture a significant portion of the information reflected in share returns, although they are not a timely source of information. Furthermore, the annual earnings announcement does convey incremental new information to the market.

An important finding of the study is that the market uses headline earnings and not basic earnings to value shares on the JSE. This validates the importance of headline earnings disclosure required by JSE-listed companies.

In addition, the study finds evidence of inefficiency on the JSE. Some post-announcement drift in share returns is observed, and the market appears to be pessimistic in its earnings expectations. The study also shows that analyst forecasts are a more accurate measure of expected earnings than prior-year earnings.

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# **CHAPTER ONE**

## **INTRODUCTION**

### **1.1. BACKGROUND TO RESEARCH**

The belief that accounting earnings convey decision-useful information to investors began to be challenged in the 1960s. People began to argue that accounting earnings disclosure was of no value, due to measurement errors in the calculation of earnings on the historic cost basis, as well as due to there being more timely sources of information.<sup>1</sup> Such arguments were of major concern to the accounting profession and consequently prompted numerous empirical investigations into the relationship between earnings and share prices.

Ball and Brown (1968) were the first to present empirical evidence that share prices do react to the information contained in newly released financial statements. The study showed that when earnings were higher than expected the share price rose and when earnings were lower than expected the share price fell. The credibility of these findings was strengthened shortly after by Beaver (1968) who came to the same conclusion using a completely different methodology. Beaver found abnormal trading volume and return variance to occur at the time of the earnings announcement, a signal of information content.

These studies opened up substantial opportunities for further investigation into the impact of accounting earnings on share prices. Subsequent areas of research included investigations into the magnitude of the market response due to the size of unexpected earnings, whether cash flows have greater information content than accrual earnings, whether quarterly earnings announcements convey useful information and whether there is evidence of post-announcement share price drift, to name a few.<sup>2</sup>

The bulk of this research has been conducted on the New York Stock Exchange (NYSE). The size, liquidity and efficiency of the NYSE, as well as the availability of

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<sup>1</sup> Such arguments appear in Canning (1929), Gilman (1939), Edwards and Bell (1961), Chambers (1964), Hendriksen (1965), Chambers (1966), Lim (1966), Benston (1967), Ijiri (1967) and Sterling (1967).

<sup>2</sup> A more detailed review of the literature in these areas is provided in Chapter Two.

share price data, have made it an ideal exchange for conducting empirical research. However, the problem exists that the findings of this body of research are specific only to the NYSE. Empirical evidence gathered from smaller stock exchanges around the world is limited. The need therefore exists for more empirical studies to be conducted on non-NYSE exchanges to verify whether the observed relationship between earnings and share returns applies across all stock exchanges.

South African studies on the JSE Securities Exchange (“JSE”) are particularly relevant due to the numerous significant differences that exist between the JSE and the NYSE. One difference is size – the JSE is a relatively small player among the world’s stock exchanges, with its market capitalisation being just over 1% and its transaction volume being only 0.7% of the NYSE (World Federation of Exchanges 2003). This makes the liquidity and efficiency of the JSE substantially lower than that of the NYSE. Other differences include the dominant industries listed on the exchanges and the disclosure requirements for the listed companies. These differences could collectively have a significant influence on the observed relationship between earnings and share returns.

Added to this, only one South African study is evident from the literature that specifically investigates the association between accounting earnings and share returns on the JSE as done by Ball and Brown (1968). This JSE study was conducted two decades ago by Knight (1983). Since then, significant changes have been made to accounting standards and disclosure requirements. This may have had a significant impact on the information content of accounting earnings, which may in turn have affected the relationship between accounting earnings and share returns. The liquidity and efficiency of the JSE has also improved dramatically over this period, which may have had a substantial impact on the behaviour of share prices.

## **1.2. OBJECTIVES OF RESEARCH**

The research problem that this study addresses is therefore whether the relationship between accounting earnings and share returns observed predominantly in NYSE studies also holds on the modern-day JSE. Since the JSE is a relatively small stock exchange in comparison to the NYSE, with substantially different characteristics, the nature of the relationship may differ between the NYSE and JSE. In investigating this relationship and comparing the findings to NYSE studies, the study aims to obtain a better insight into the information content of accounting earnings disclosures in South Africa relative to the rest of the world.

In addressing this primary research problem, three complementary areas are also examined.

Firstly, the study evaluates the relative information content of two different earnings measures, namely basic earnings and headline earnings. In South Africa, a headline earnings figure is disclosed by all listed companies and is widely used in valuations. The study aims to determine whether this earnings measure is more closely related to share returns than basic earnings, thus providing evidence of whether headline earnings is a better indicator of company value.

Secondly, the ability of analysts to incorporate new information into earnings forecasts is evaluated. Analyst consensus forecasts of expected earnings are widely published in South Africa and may serve as a better expectation of earnings than prior year earnings. The study investigates whether this is in fact true.

Thirdly, the efficiency of the JSE is evaluated through an examination of share returns in the period beyond the announcement date.

In summary, the objectives of the study are to determine whether:

- price-sensitive information reflected in share returns is captured in annual earnings;
- the annual earnings announcement is a timely source of new information to the market;
- headline earnings is a better measure of share value to investors than basic earnings;
- whether analyst forecasts are a superior indicator of expected earnings than prior-year earnings; and
- whether post-announcement drift in share returns is observed, providing evidence of market inefficiency.

### **1.3. SCOPE AND LIMITATIONS OF RESEARCH**

The study investigates annual preliminary earnings announcements on the JSE for the financial years ended 1997 to 2002. The sample of observations obtained within this period was limited, however, by the availability of data relating to daily share returns, analyst earnings forecasts and earnings announcement dates. Limitations relating to data collection are discussed in detail in Chapter Four.

### **1.4. STRUCTURE OF REPORT**

The report is structured as follows:

- Chapters Two and Three provide the relevant background knowledge. Chapter Two reviews prior literature on the relationship between accounting earnings and share returns. Chapter Three then reviews the distinguishing characteristics of the JSE, the exchange on which this study is conducted.
- Chapter Four provides information relating to the study's empirical analysis. The chapter first sets out the research hypotheses to be tested. The research methodology is then discussed, followed by the details on data collection.
- Chapters Five and Six analyse the empirical findings of the study. Chapter Five provides a detailed discussion of the empirical findings and Chapter Six presents the results of the statistical tests.
- Chapter Seven draws conclusions based on the empirical analysis and statistical tests, as well as on the previous studies and theories discussed in the literature review. The chapter ends with concluding remarks and a discussion of areas for future research.

## **CHAPTER TWO**

### **REVIEW OF LITERATURE**

#### **2.1. FINANCIAL STATEMENTS AS A SOURCE OF INFORMATION**

Investors require information about a company in order to place a value on it. They are able to obtain this information from a variety of sources, one of which is the accounting information contained in the annual financial statements. The earnings figure is arguably the single most important disclosure therein, being a measure of the overall company performance over the year. The close link between earnings and company value is apparent from valuation theory. The theory states that the intrinsic value of a share equals the present value of expected future cash flows. Over the company's lifetime, earnings and cash flows must be equal. It follows that earnings is closely related to share value.

The link between earnings and share value is less clear over shorter intervals such as yearly periods, however. In accrual accounting, the effects of transactions are recognised when they occur, rather than when cash is received or paid, as a means of estimating the earnings over a short period. Because estimates need to be made in these calculations, earnings in the short term is inevitably an imperfect measure of value to the investor. Added to this, earnings is a measure of the historic performance of the enterprise, whereas shares are valued based on future earnings and cash flow predictions. The relationship between earnings and share prices is thus less explicit over the short term (Ball and Kothari 1994). As a result, the information content of the annual earnings figure is more uncertain.

#### **2.2. THE DEBATE CONCERNING THE INFORMATION CONTENT OF EARNINGS**

Despite annual earnings being an imperfect measure of value, anecdotal evidence suggests that accountants believe earnings still to convey useful information to its users. The earnings figure, in summarising the historic performance of an enterprise, is seen to be of value to investors in assessing past performance as well as in helping to predict future performance. Yet this belief in the information content of earnings had not been validated empirically by the 1960s.



In the 1960s, the assumption that accounting information (including the earnings figure) conveys decision-useful information to investors was challenged. Hendriksen (1965, p.97) observes that “already there are rumblings that the income statement will see its demise in the near future unless drastic changes are made to improve the story it tells”. Many doubted whether the historic cost accounting information was of any value to investors. As Beaver (1968, p.68) explains, the two most compelling reasons for earnings lacking informational value were as follows:

- (i) measurement errors in earnings are so large that it would be better to estimate the share value directly from the instrumental variables rather than use earnings as an intermediate step, and
- (ii) even though earnings may convey information, there are other sources available to investors that contain essentially the same information but are more timely – by the time earnings are announced, all of its information content has already been impounded into the share price.

Such arguments were of major concern to the accounting profession. The implication that accounting information did not provide investors with decision-useful information was that accountants were essentially not adding any value to society by producing financial statements, as all the information contained therein was already known to the market through other media prior to publication. Benston (1967) found that share price changes were largely insensitive to earnings data, apparent evidence that earnings data does not have information content. This prompted numerous empirical investigations to be conducted into the relationship between earnings and share prices.

### **2.3. DEVELOPMENTS FACILITATING MARKET-BASED ACCOUNTING RESEARCH**

Market-based accounting research obtained its impetus from major developments in finance theory during the late 1950s and early 1960s (Lev and Ohlson 1982). The development of the efficient market hypothesis, the capital asset pricing model and event study methodology were all instrumental in the market-based accounting research that followed soon after.

### **2.3.1. Efficient Markets Hypothesis (EMH)**

Fama (1965) introduced the concept of an efficient securities market as one in which security prices fully reflect all available information. He notes that in an efficient market, competition among investors “will cause the full effects of new information on intrinsic values to be reflected ‘instantaneously’ in actual prices” (Fama 1965, p.4). The realisation that in an efficient market, share prices move only as a result of new information was of critical importance to researchers. This is because it enabled the usefulness of new accounting information to be observed through its impact on share prices.

### **2.3.2. Capital Asset Pricing Model (CAPM)**

The CAPM, developed by Sharpe (1964) and Lintner (1965), shows that the expected return for a security is dependent on its level of systematic risk. By knowing the risk-free rate, the market premium and the sensitivity of the security’s returns relative to market returns, the expected return of a security can be estimated. This enabled researchers to determine the unexpected component of share returns, representing the market’s reaction to new information entering the market.

### **2.3.3. Event study methodology**

In an event study, the level or variability of share prices or trading volume are analysed around the time of an event. This methodology combines efficient market theory and the CAPM to evaluate the impact of new information on investor valuations as seen through abnormal share returns around the time of the event.

## **2.4. THE PIONEERING EMPIRICAL STUDY: BALL AND BROWN (1968)**

Ball and Brown (1968) were the first to present empirical evidence that share prices do react to the information contained in newly-released financial statements. In doing so, the study provides persuasive evidence that earnings announcements convey relevant and timely information to investors.

In the study, a sample of 261 firms listed on the New York Stock Exchange (NYSE) were investigated over the nine years 1957 to 1965, providing a total of 2340 earnings announcements. Only firms with 31 December year-ends were used in the study.

#### **2.4.1. Methodology of the study**

The study classified firms into two portfolios based on the sign of their unexpected earnings. Firms with actual earnings above expectations were classified in the 'good news' portfolio, whereas firms with actual earnings below expectations were classified in the 'bad news' portfolio. The abnormal returns of the two portfolios were then examined. It follows that models were required to determine both unexpected earnings as well as abnormal returns.

Two different earnings expectation models were used, which are referred to as the naive model and regression model. The naive model assumes that current year earnings will be the same as previous year earnings, implying that any change in earnings is unexpected. The regression model, on the other hand, takes into account the fact that due to economy-wide effects, the incomes of firms historically move together over time. An accounting beta is calculated for each firm, quantifying the past sensitivity of the firm's change in income to the change in the market's income. Using this accounting beta, each firm's expected earnings change is calculated after determining the change in the market's income in the year of investigation. Thus, using the regression model, if the actual income change is greater than expected, this is classified as 'good news' while if the actual income change is less than expected then this is classified as 'bad news'.

Three different earnings measures were used in the study – net income and EPS (earnings per share) (variables 1 and 2 respectively in figure 1) for the regression model, and EPS (variable 3) for the naive model.

Expected share returns were calculated using the CAPM. The abnormal return component was then isolated by removing the expected return from the actual return. The abnormal share returns were then cumulated for the 'good news' and 'bad news' portfolios using the API (Abnormal Performance Index) metric. The API traces the value of one dollar invested over the specified period, after adjusting for expected share returns.

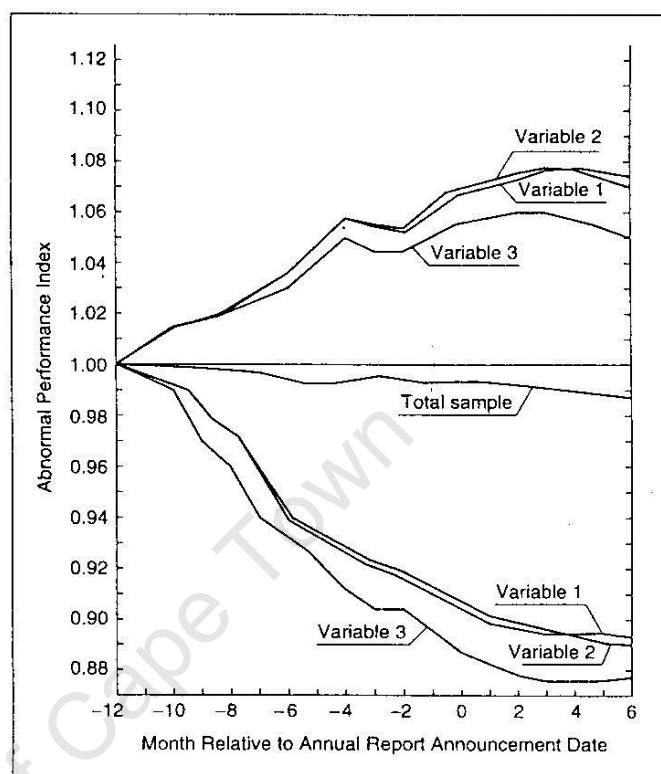
## 2.4.2. Findings of the study

Ball and Kothari (1994) point out that from figure 1 provided in Ball and Brown (1968), four inferences can be made:

### **(a) Annual earnings are positively correlated with share returns**

'Good news' companies (whose earnings exceeded expectations) exhibited abnormally high share returns over the twelve months leading up to the earnings announcement, and vice versa for 'bad news' companies. This association study reveals that at least some of the information about a company affecting its share price is captured in its earnings.

**Figure 1: Abnormal returns for Good and Bad News firms**  
Source: Ball and Brown (1968)



### **(b) Annual earnings announcements are not a timely source of information**

As figure 1 illustrates, most of the share price movement (85 to 90 percent) occurred leading up to the annual earnings announcement. This indicates that other more timely sources of information are used by investors to value shares, which include quarterly earnings announcements.

### **(c) Earnings announcements contain new information**

Abnormal share returns were still positive among 'good news' companies at the time of the earnings announcements, and negative for 'bad news' companies. Thus, although most of the earnings change is expected by the announcement date, the announcement still conveys some new information to investors.

#### ***(d) Evidence of post-announcement drift in share prices***

Counter to efficient market theory, share prices continued to drift in the same direction for at least two months after the earnings announcement.

### **2.5. SUBSEQUENT STUDIES OF EARNINGS AND SHARE PRICES**

Following on from Ball and Brown, the relationship between accounting information and share returns was investigated from numerous different perspectives.

#### **2.5.1. Magnitude of market response**

Ball and Brown (1968) simply show that good news causes share prices to rise and bad news causes share prices to fall. These measures of unexpected earnings (good versus bad) do not, however, examine whether the magnitude of the unexpected earnings change influences the magnitude of abnormal share returns. Beaver (1974) uses the same methodology as Ball and Brown to investigate the impact of the size of unexpected earnings on share returns. He finds that share portfolios with the greatest unexpected earnings change exhibit the greatest absolute abnormal share returns. Patell's (1976) study uses management earnings forecasts as the expected earnings and produces the same results. Beaver, Clarke and Wright (1979) investigate the magnitude of the market response by dividing a sample of NYSE shares into 25 portfolios based on unexpected earnings per share (EPS) changes, using the accounting beta method as in Ball and Brown. They find that the portfolios ranked on this basis are highly correlated to their abnormal share returns.

These results show that the greater the unexpected earnings, the larger the share price movement. This is consistent with the logic that the larger the unexpected earnings, the greater will be investors' revision of the intrinsic value of a company's shares. This, in turn, causes a larger share price adjustment.

#### **2.5.2. Earnings Response Coefficients**

Following on further from Beaver, Clarke and Wright (1979) is the concept of an earnings response coefficient. This area of research investigates whether a given change in expected earnings causes a larger change in share prices for some companies than for others. Factors such as firm risk, capital structure, persistence and

quality of earnings, growth opportunities and price informativeness have all been extensively investigated in the literature as reasons for differential market responses among companies. A detailed review of the literature in this field of research can be found in Kothari (2001).

An understanding of why markets react more strongly to some firms than to others is useful to accountants. As Scott (1997) explains, it helps accountants to understand what information investors regard as important in valuing companies. By recognising what information is regarded as important, accountants can strive to provide more detailed disclosure of such information to assist investors in their valuations. This consequently enhances the decision-usefulness of financial statements.

### **2.5.3. Accrual earnings versus cash flows**

As Lev and Ohlson (1982) point out, some practitioners believe that cash flows reflect the economic realities of a firm's performance better than accrual earnings. This is because cash, unlike earnings, cannot be manipulated through management adjusting accounting policies. The counter-argument is that earnings is more informative as the accrual process improves the measurement of the firm's true economic performance.

Ball and Brown (1968) use a crude measure of cash flows (earnings plus depreciation) and find unexpected accrual earnings to produce larger abnormal share returns than unexpected cash flows. This is consistent with earnings being more informative, though the difference in the study is not found to be significant. Numerous studies have been performed since then, including Rayburn (1986), Bowen et al. (1987), Livnat and Zarowin (1990) and Dechow (1994). For example, Wilson (1987) finds evidence that the market does favour cash flows over accruals yet Bernard and Stober (1989) find no such evidence in a similar study.

Scott (1997) suggests that the apparent ambiguity can be explained by the fact that accruals contain a discretionary component. While management can use accruals to manipulate earnings, they can also use them to disclose some of their inside information. "Since these effects work in opposite directions, it may indeed be difficult to find a distinction empirically between cash flows and accruals with respect to market reaction." (p.112)

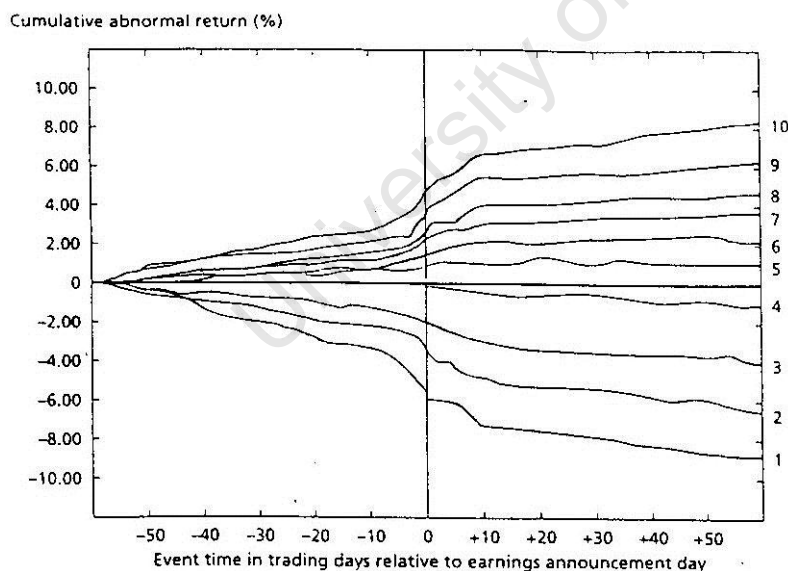
#### 2.5.4. Quarterly earnings announcements

In addition to annual earnings, companies listed on the NYSE are required to make quarterly earnings announcements. Such announcements are of interest, being more timely sources of information than annual earnings announcements. Numerous studies have thus followed on from Ball and Brown by investigating the impact of unexpected quarterly earnings on share returns.

One such study is by Foster, Olsen and Shevlin (1984). They divide their sample of over 56 000 observations into deciles based on their unexpected quarterly earnings. Over the sixty trading days leading up to the quarterly earnings announcements, the deciles are perfectly ranked by their residual share returns – the top decile (with the highest positive unexpected earnings) exhibits the highest positive residual return, going down in order to the bottom decile (with the worst unexpected quarterly earnings) showing the most negative residual return. This confirms that the results of Ball and Brown exist in quarterly earnings as well.

Figure 2: Cumulative abnormal returns in response to quarterly earnings announcements

Source: Foster, Olsen and Shevlin (1984)



#### 2.5.5. Impact of using a longer investment horizon

New economic developments that will affect future profits may only partly be reflected in the current earnings figure relating to the past year. Since it is this type of new

information that drives share prices, it follows that the longer the period over which earnings is measured, the closer the link between earnings and share prices.

Based on this logic, Easton, Harris and Ohlson (1992) investigate the relationship between earnings and share prices over periods of up to ten years. They find that the relationship does strengthen over time periods of longer than a year, consistent with the above logic.

Kothari and Sloan (1992) look at the issue from the perspective of prices leading earnings. This means that price changes anticipate future earnings changes. Ball and Brown's 1968 study illustrates this effect over the one year period leading up to the earnings announcement. Kothari and Sloan extend the investigation period and find that prices lead earnings by as much as four years. The implication is that it can take up to four years for new information reflected in share prices to come through in earnings. Ball and Kothari (1994) point out that such studies are of value in helping us improve our understanding of the relationship between accounting earnings and share prices.

#### **2.5.6. Study of earnings anomalies: post-announcement share price drift**

The Ball-Brown study clearly shows that prices continue to move in predictable directions for at least two months after earnings are announced. This phenomenon, which seems to be contradictory to the efficient market hypothesis, has come to be known as post-announcement drift. Numerous subsequent studies, such as by Rendleman, Jones and Latane (1982), Foster, Olsen and Shevlin (1984), Bernard and Thomas (1990), Ball and Bartov (1996) and Kraft (1999), have found further evidence of this drift.

The most intuitive explanation for this phenomenon is that capital markets are inefficient. The fact that prices do not appear to adjust instantaneously to new information creates the possibility for simple trading strategies to be developed that are able to earn abnormal returns. This ability to earn abnormal returns is contrary to market efficiency.

However, other arguments have been proposed that are in support of capital markets being efficient. The first such argument is that the models used to estimate abnormal returns and unexpected earnings are inadequate. It is argued that the CAPM, for



example, omits certain key variables that do affect share returns, and that the beta estimation required in the model is also problematic due to the fact that betas tend to change over time. The second argument in favour of market efficiency states that the studies rely on the use of information not available to the market at the time investors were trading in these shares. A third argument is that the samples used are not completely random because firms that have not survived throughout the investigation period are excluded from the studies. The last major argument is that the observations are time-period specific and are therefore not expected to recur.

Bernard and Thomas (1990) investigate almost 100 000 quarterly earnings announcements. They divide their observations into deciles based on the size of unexpected earnings. They then track the performance of an equally-weighted portfolio that buys shares in the top decile and sells short shares in the bottom decile immediately after their quarterly earnings announcements. The portfolio would have earned a positive abnormal return of 4.19% over sixty trading days and 7.74% over 180 trading days beyond announcement, a clear indication of market inefficiency.

Foster, Olsen and Shevlin (1984) conduct an interesting study into the post-announcement drift anomaly. In forming deciles based on unexpected quarterly earnings, they use four different earnings expectation models. The first two models are similar to those used by Ball and Brown. Models 3 and 4, however, use share returns as the basis for estimating unexpected earnings. The motivation for this is that share returns are expected to provide a more reliable indication of the market's true earnings expectations than the simple models used in prior studies.

<b>TABLE 1</b> <b>Cumulative Average Residuals for Forecast Error Portfolios: Days [+1,+60]</b> Source: Foster, Olsen and Shevlin (1984)				
Decile	Model 1	Model 2	Model 3	Model 4
1	-3.02	-3.08	0.04	0.17
2	-2.59	-2.73	0.40	0.47
3	-1.58	-1.78	0.06	0.42
4	-1.34	-0.92	-0.06	0.16
5	-0.48	0.22	0.00	0.39
6	0.55	0.79	0.14	-0.02
7	1.31	1.32	-0.02	0.07
8	2.46	1.70	0.03	-0.13
9	3.22	2.21	0.13	0.12
10	2.93	3.23	0.11	-0.37

Models 1 and 2 both exhibit post-announcement drift. As table 1 illustrates, over the sixty trading days beyond announcement, the decile 1 (with the most negative unexpected earnings) generates an abnormal return of  $-3.02\%$  and  $-3.08\%$ , and decile 10 (with the most positive unexpected earnings) generated an abnormal return of  $2.93\%$  and  $3.23\%$  (for models 1 and 2 respectively). Interestingly, though, models 3 and 4 show little or no evidence of drift. The abnormal returns are only  $0.04\%$  and  $0.17\%$  for decile 1, and  $0.11\%$  and  $-0.37\%$  for decile 10, for models 3 and 4 respectively. This finding suggests that one explanation for post-announcement drift may be that the models used to estimate unexpected earnings are inaccurate, as when models 3 and 4 are used no drift is observed.

Ball (1992) summarises the research on earnings anomalies. He finds evidence that abnormal returns can be earned from publicly available information, while other evidence is found to contradict this, suggesting that capital markets are in fact efficient.

## 2.6. RELATIONSHIP BETWEEN EARNINGS AND SHARE RETURN VARIANCE

The studies reviewed thus far have focused on the *mean* of the residual (unexpected) share returns distribution around an earnings announcement. Beaver (1968) takes a different approach by examining the *variance* of this residual share return distribution. The advantage of this approach is that an earnings expectation model is not required, meaning that the study's results are not dependent on the accuracy of the model used to estimate the expected earnings.

Security return variability (SRV) is measured in the study using the following formula:

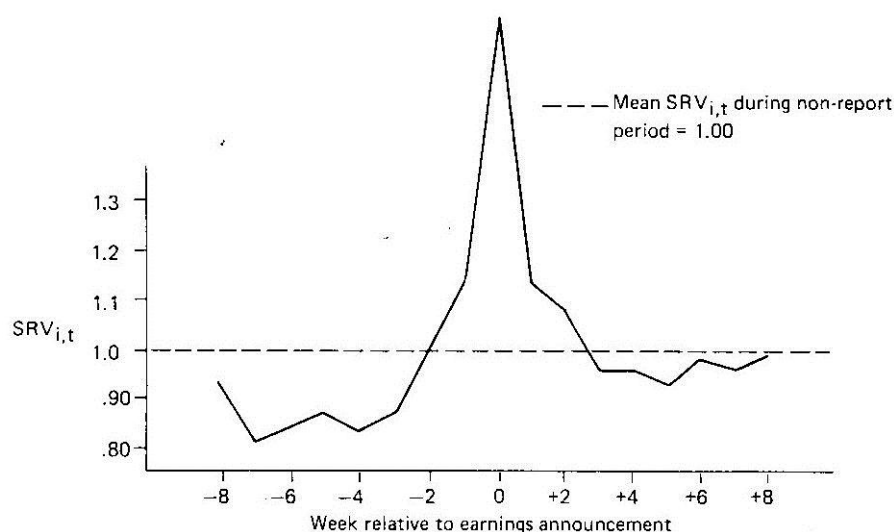
$$SRV_{i,t} = \frac{U_{i,t}^2}{V(U_{i,t})}$$

where  $U_{i,t}$  = abnormal return of share  $i$  in time  $t$

$V(U_{i,t})$  = variance of abnormal returns in a non-announcement period

**Figure 3: Security return variability reaction to annual earnings announcements**

Source: Beaver (1968)



The variability in share returns in the week of the announcement is found to be significantly greater than the average variability during the weeks before and after the announcement, as illustrated in figure 3. This observation is consistent with the reasoning that the new information contained in earnings announcements causes investors to revise their share valuations, increasing share activity and volatility as individual investors trade on this new information.

Whereas Beaver (1968) uses weekly data from the NYSE, Morse (1981) uses daily data and obtains similar results. Patell and Wolfson (1981) examine stock prices on a transaction-by-transaction basis relating to quarterly earnings announcements and also find the residual return variance to be significantly larger at the time of these announcements.

## **2.7. RELATIONSHIP BETWEEN EARNINGS AND TRADING VOLUME**

Beaver (1968) examines fluctuations in trading volume as a further indication of new information flowing into the market. A clear distinction is drawn by Beaver between price and volume tests. As he puts it, price tests “reflect changes in the expectations of the market as a whole while [volume tests] reflect changes in the expectations of individual investors. A piece of information may be neutral in the sense of not changing the expectations of the market as a whole but it may greatly alter the expectations of individuals. In this situation, there would be no price reaction, but there would be shifts in portfolio positions reflected in the volume” (Beaver 1968, p.69). In other words, price

and volume reactions occur for different reasons – prices react when the market consensus changes whereas volume reacts when the perceptions of individual investors change. Though both often occur at the time of earnings announcements, only one of the variables need be above average for it to signal the arrival of new information. In analysing trading volume, as with return variance, the need to apply an earnings expectations model is circumvented.

Trading volume activity (TVA) is the measure used by Beaver (1968) to examine trading volume:

$$TVA_{i,t} = \frac{\text{Number of shares of firm } i \text{ traded in time } t}{\text{Number of shares of firm } i \text{ outstanding in time } t}$$

**Figure 4: Trading volume reaction to annual earnings announcements**

Source: Beaver (1968)

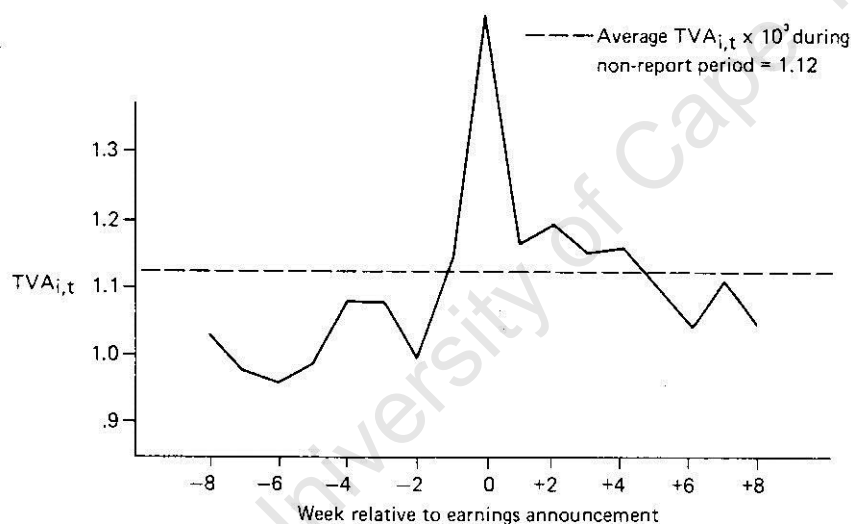


Figure 4 illustrates the observed trading volume activity in the 17 week period on either side of the annual earnings announcement week. The dashed line represents the average TVA in the non-report period. The figure clearly illustrates a dramatic increase in volume in the announcement week (33% higher than the average TVA in the non-report period), consistent with the assertion that earnings announcements have information content.

## 2.8. STUDIES ON OTHER INTERNATIONAL STOCK EXCHANGES

The majority of the aforementioned studies have been conducted on the NYSE. Foster (1978) emphasises that evidence from non-NYSE markets is important. This is because if the results found on the NYSE are supported on other stock exchanges using different data bases, one's confidence in the generality of the results (rather than the results being period or sample specific) is increased.

Several studies have been conducted on other stock exchanges to observe whether similar reactions to earnings announcements occur on non-NYSE exchanges. Studies on the major stock markets in Australia, New Zealand, Israel, Japan, Sweden and England are reviewed here.

Brown (1970) uses the same methodology as Ball and Brown (1968) on the Sydney Stock Exchange. A sample of 118 firms are examined over the period 1959 to 1968, and he finds an almost identical reaction to earnings announcements. Over the twelve months leading up to the earnings announcement, the 'good news' portfolio generates a positive abnormal return of 5.0% and the 'bad news' portfolio generates a negative abnormal return of 9.0%.

Emanuel (1984) examines 1 196 earnings announcements by New Zealand firms over the period 1967 to 1979. The observations are divided into six portfolios based on the magnitude of unexpected earnings, and the portfolios are found to be perfectly ranked based on their cumulative abnormal returns over the 50 week period leading up to the announcement (refer to table 2). Share returns are therefore found to be positively correlated to the magnitude of unexpected earnings.

<b>TABLE 2</b>						
<b>Emanuel (1984): Portfolio Cumulative Abnormal Returns over 50 weeks leading up to Earnings Announcements</b>						
Portfolio	1	2	3	4	5	6
CAR	-11.2%	-4.4%	-3.6%	0.2%	3.8%	12.8%

Deakin, Norwood and Smith (1974) report significant residual volume activity in the week of the release of company results on the Tokyo Stock Exchange, consistent with Beaver (1968). However, contrary to Beaver (1968), they find no significant residual price variation in the announcement week, and conclude that earnings announcements

change individual expectations but not market expectations. Knight (1983) reports though that this observation could be due to methodological weaknesses in their study. The sample of 42 firms are all aligned in the same calendar week (the week in which their annual earnings are published in the Japan Economic Journal), and Knight points out that “this dramatically weakens the power of the test as the results are in effect based on only one observation and thus confounding errors are not adequately controlled” (p.66).

Forsgardh and Herten (1975) examine 19 earnings announcements on the Stockholm Stock Exchange. Interestingly, they establish the expected earnings for each firm through direct communication with major Swedish investors. Knight (1983) explains the methodology used in this study – price residuals are regressed with the rate of change in earnings expectations, i.e.  $\log_e(\text{actual earnings} / \text{expected earnings})$ . They observe the relationship between these two variables before and after announcement by calculating the  $R^2$  (coefficient of determination) for each regression before and after. The results indicate that expectations did change after earnings announcements, supporting the claim that earnings releases have information content.

Firth (1981) uses the absolute residuals methodology of Beaver (1968) on the London Stock Exchange on a sample of 120 firms. For each firm, the mean absolute weekly residual is ranked in descending order of magnitude. He finds that the preliminary announcement week is ranked first, with the week of the interim report or annual report ranked second and third. He concludes that preliminary report contains significant information content, consistent with Beaver’s (1968) findings.

A further study on the London Stock Exchange is conducted by Maingot (1984), who uses the security return variability (SRV) measure on 100 firms over the period 1976 to 1978. In the United Kingdom, dividends are announced at the same time as earnings and therefore it is only possible to examine the joint impact of these announcements. This differs to Beaver’s (1968) study that specifically excludes the observations where dividends and earnings are announced simultaneously. Maingot (1984) finds the announcement week to exhibit the highest mean SRV of 4.033, significantly greater than the mean SRV of 0.553 in the eight weeks before and eight weeks after the announcement week. This finding is consistent with the hypothesis that earnings and dividend announcements have information content. Interestingly, the second highest

SRV is observed in the week before the announcement week, indicating anticipatory reactions from investors prior to announcement.

Lev and Yahalomi (1972) replicate the abnormal volume analysis of the Beaver (1968) study on the Tel Aviv Stock Exchange and find no significant trading volume in the weeks surrounding earnings announcements. They conclude that the accounting reports have no significant information content. However, Knight (1983) points out that Israeli firms do not formally announce their earnings before submitting their annual reports to the stock exchange. Consequently, due to the considerable delay between the financial year-end and the submission of the annual report, more price-sensitive information could leak out, reducing the informativeness of the annual report. Knight (1983) therefore argues that the findings of Lev and Yahalomi (1972) are actually consistent with efficient market theory, rather than being inefficient as suggested by the authors.

## **2.9. STUDIES ON THE JSE SECURITIES EXCHANGE**

The first investigation into the association between published accounting data and the behaviour of share prices on the JSE was undertaken by Knight (1983). The study investigates both the mean and the variance of residual returns in the period surrounding earnings publications. During the period 1973 to 1980, a total of 261 announcements from 41 companies are used. The announcement of all three statutory reports are investigated, namely the interim, preliminary and annual reports.

### **2.9.1. Methodology of investigation**

Knight (1983) applies the same methodology as used in the Ball-Brown study. In determining abnormal returns, Knight calculates betas for each company by quantifying the sensitivity of share returns relative to market returns. As in the CAPM, the betas are then used to calculate the expected returns that are subtracted from the actual returns to leave the abnormal returns. The API metric is also used to cumulate residual returns. Furthermore, Ball-Brown's regression and naive income expectation models are used to classify shares into 'good news' and 'bad news' portfolios.

To investigate the information content of earnings announcements from a different perspective, Knight also performs an absolute residual analysis as done by Beaver

(1968). In this approach, squared residual returns are divided by the estimated variance for the full 404 weeks of data, to identify abnormally large residual returns.

### **2.9.2. Findings and conclusions**

The following conclusions are drawn from Knight's (1983) findings:

- An association does exist between the sign of earnings forecast errors (positive or negative) and the sign of annual abnormal returns, consistent with the findings of Ball and Brown (1968).
- In the announcement week, though, such an association is not observed. Abnormal returns are significantly positive for both 'good news' and 'bad news' portfolios, although the magnitude of the reaction is larger for 'good news' releases.
- Contrary to the findings of Ball and Brown (1968) on the NYSE, the JSE market therefore appears to be pessimistic in that 'good news' requires confirmation of 'hard information' (through the earnings announcement) whereas 'bad news' is largely already impounded.
- Results similar to those obtained by Beaver (1968) are reported. The residual variation is observed to be 78.4% higher than normal during the preliminary announcement week (compared to Beaver's (1968) 67%). Knight (1983) tentatively concludes that South Africa's preliminary report is therefore perceived to be relatively more informative than the US counterpart. He explains that this is expected due to the US having richer alternative information sources relating to company performance.
- The second and third highest residual variations occur in the weeks of the interim report and annual report respectively. This indicates that the announcement of the preliminary report has the most significant information content, followed by the interim report and then the annual report.
- A degree of non-random drift in share returns is observed for a number of weeks following the announcement, indicating a certain level of inefficiency.



### **2.9.3. Subsequent empirical studies on the JSE**

Subsequent studies on the JSE have investigated topics such as the association between inflation-adjusted accounting income and the behaviour of share prices (Gevers 1992). Van Heerden (2001) examines the relationship between firm size and the share price reaction to earnings announcements. However, no South African studies subsequent to Knight (1983) were found that investigate share price reactions to unexpected earnings. Significant changes have occurred on the JSE over the last two decades and there is therefore a need for such a study to be conducted.

## **2.10. FORECASTS OF EXPECTED EARNINGS**

As a starting point, empirical studies investigating the relationship between earnings and share returns need to determine the unexpected component in earnings announcements, being the new information flowing to the market. It follows that expected earnings needs to be determined. Kothari (2001) identifies and reviews three main categories of earnings forecasts available to the market, namely time-series, analyst and management forecasts.

### **2.10.1. Time-series earnings forecasts**

This type of forecast makes use of the readily-available past earnings data to predict earnings into the future.

#### ***(a) Random walk property of annual earnings***

Studies by Little (1962), Little and Rayner (1966), Lintner and Glauber (1967) and Ball and Watts (1972) among others suggest that annual earnings tend to follow a random walk or a random walk with drift. A random walk implies that current year earnings are expected to be the same as previous year earnings, and any change in earnings is unexpected. The drift component implies that a degree of autocorrelation exists in annual earnings in that it tends to move in predictable directions. This random walk property of annual earnings is not intuitive. As Kothari (2001, p.145) explains it, “accounting earnings do not represent the capitalisation of expected future cash flows like prices. Therefore, there is no economic reason to expect annual earnings to follow a random walk”. Ball and Brown’s (1968) naive earnings expectation model makes the assumption that earnings follow a random walk without drift.

### ***(b) Properties of quarterly earnings***

Being four times more frequent than annual earnings, quarterly earnings announcements are a more timely source of information to investors. Therefore, on exchanges where quarterly results are announced, quarterly earnings forecasts may serve as a more accurate proxy of what the market expects future earnings to be. At the same time, though, the shorter measurement period may result in reduced association between earnings and share returns. Since share prices react to forward-looking information that will affect future cash flows, the impact of the new information may not yet be observable in current quarterly earnings. Annual earnings, being measured over a longer time interval, may display more of the effects of new information than quarterly earnings. (Kothari 2001)

Kinney et al. (1999) provide evidence of this relatively poor association. The study shows that the probability of share returns and the earnings surprise being either both positive or both negative is only 60% even when reputable published earnings forecasts are used.

Kothari (2001) makes the point that capital market researchers use quarterly earnings time-series models mainly to test for post-earnings-announcement drift. Management and analyst forecasts are far more commonly used, as they are easily available and more highly associated with share returns.

### ***(c) Properties of components of earnings***

Since the earnings figure is an aggregation of many components, there may be incremental value in examining these components individually. This would help obtain a better understanding of how earnings is composed so as to improve the accuracy of the earnings forecast. Numerous studies investigate whether taking into account earnings components can improve the association of earnings with share returns. This is a vast area of research that incorporates earnings response coefficient studies, and is beyond the scope of this literature review.<sup>3</sup>

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<sup>3</sup> Studies into earnings response coefficients include, among others, those by Collins and Kothari (1989), Easton and Zmijewski (1989), Dhaliwal, Lee and Fargher (1991), Kormendi and Lipe (1987), Ramakrishnan and Thomas (1991), and Lev and Thiagarajan (1993).

### **2.10.2. Analyst earnings forecasts**

Analysts from brokerage houses and investment banks often provide earnings forecasts to the public based on their research into selected companies. In making such forecasts, numerous quantitative and qualitative information sources are used, including macroeconomic forecasts, industry trade association reports, annual and interim reports, company visits and interviews with management. Being issued by well-educated, experienced analysts, the forecasts are a useful information source to the market. The review of analyst forecasts that follows is largely based on the work of Kothari (2001) and Foster (1986).

#### ***(a) Comparison of analyst forecasts to time-series forecasts***

Numerous studies have investigated whether analyst forecasts are a more accurate predictor of earnings than time-series forecasts, and in a similar vein have also investigated the degree of association between earnings forecasts and share returns. The dominant finding among such studies is that analyst forecasts are in fact more accurate (Foster 1986). One such study is by Brown et al. (1984), who compare analyst forecasts of quarterly earnings to forecasts produced by three different univariate time-series models. They find analyst forecasts to be more accurate than each of the three time-series models, and also find that the longer the forecast horizon, the larger the mean absolute forecast error (and thus the lower the accuracy).

Kothari (2001) attributes the superior accuracy of analyst forecasts to security analysts having a timing advantage – analysts are able to incorporate into their forecasts more recent information that becomes available after the latest earnings announcement.

Foster (1986) also points out that on top of the timing advantage, analysts have access to a wider base of information than simply past earnings. In support of this, Brown et al. (1987) demonstrate the accuracy of analyst quarterly earnings forecasts and their degree of association with share returns to be better even after controlling for the timing advantage. This is further supported by Collins and Hopwood (1980), who examine the extreme forecast errors their sample and find that “analysts generated outliers that were lower both in number and degree than the univariate models. Investigation into the economic events that were the underlying causes of these outliers (for example, a strike) generally indicated that analysts were more capable of

incorporating the effects of these economic events as the events became known.”  
(p.402)

Other studies, such as by Imhoff and Pare (1982) and O’Brien (1988) though, provide conflicting evidence regarding the superiority of analyst forecasts. Despite this, Kothari (2001) points out that analyst forecasts have become accepted as a better indication of market expectations than time-series forecasts.

### ***(b) Optimism bias in analyst forecasts***

Numerous studies have found evidence of analyst forecasts being positively biased (such as LaPorta (1996), Dechow and Sloan (1997), and Rajan and Servaes (1997)), though this bias seems to have reduced substantially over time. Brown (1998) finds an optimistic bias of 2.6 cents per share in 1993 becoming a pessimistic bias of 0.39 cents per share in 1997. Richardson et al. (1999) find similar results to Brown (1998), and also find that when the forecast horizon is shortened from one year to one month, the bias declines from 0.91% of the price to just 0.09% of the price.

Kothari (2001) identifies two reasons for the decline in this observed bias. Firstly, analysts are learning from evidence of past biases. And secondly, the quality of data used by researchers in investigating these biases has improved – the data itself suffers less from survivorship and selection biases.

### ***(c) Efficiency of analyst forecasts***

Evidence exists that analyst forecasts are not perfectly efficient in that they do not fully incorporate past information into their forecasts. Studies by Lys and Sohn (1990), Klein (1990) and Abarbanell (1991) indicate that analysts underreact to past information in preparing forecasts. Lys and Sohn (1990), Mendenhall (1991), and Ali and Zarowin (1992) find serial correlation in forecast revisions, an indication of inefficiency. Kothari (2001) explains that the inefficiency may be as a result of the costs of incorporating all publicly available information outweighing the benefits.

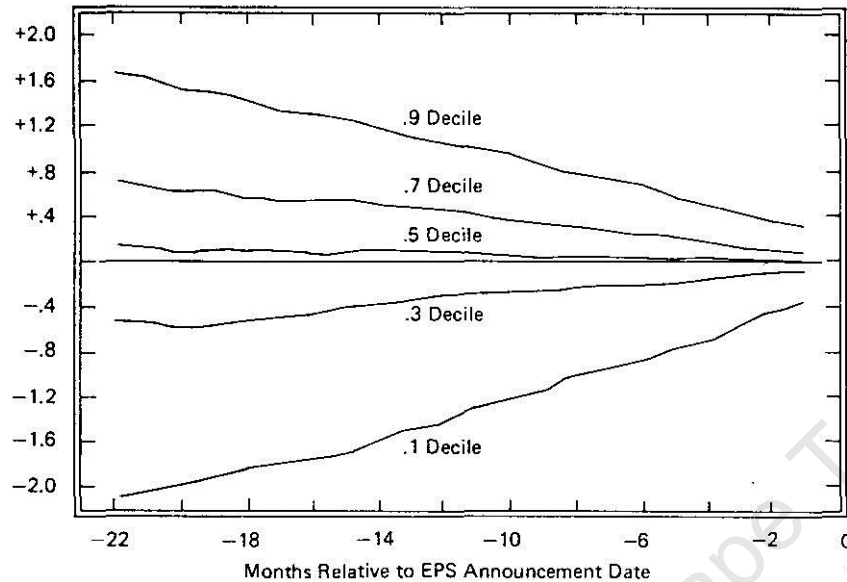
### ***(d) Forecast error evidence***

Brown, Foster and Noreen (1985) examine the mean absolute analyst forecast errors in various months leading up to the earnings announcement. Their results clearly

indicate that analyst EPS forecasts become progressively more accurate as the announcement date approaches (refer to figure 5).

Figure 5: Deciles of distribution of mean absolute forecast error: effect of length of forecast horizon

Source: Brown, Foster and Noreen (1985)



The observed decrease in dispersion is expected for two reasons, as explained by Foster (1986). Firstly, as interim EPS announcements (which form part of the annual EPS figure) are announced, so they are incorporated into analyst forecasts. Secondly, as time advances, so more information becomes available relating to the likely state of the firm for the remainder of the year. Chrichfield, Dyckman and Lakonishak (1978) also produce results consistent with this hypothesis.

Elton, Gruber and Gultekin (1984) investigate the source of analyst forecast errors over the period 1976 to 1978, i.e. how much of the forecast error is attributable to “(1) the inability of analysts to predict what EPS will be for the economy (actually for the total of firms in our sample), (2) the analysts’ misestimating the differential performance of individual industries, and (3) the inability to predict how each firm will differ from its industry average” (p.356). Their results, summarised in table 3, indicate that “the vast majority of error in forecasting arises from misestimates of industry performance and company performance” (p.358) as opposed to misestimates relating to the overall economy.

TABLE 3			
Percentage decomposition of forecast errors attributable to economy, industry and firm components			
Source: Elton, Gruber and Gultekin (1984)			
Forecast month	Economy component	Industry component	Firm component
March	2.4%	36.2%	61.4%
June	2.7%	29.4%	67.9%
September	2.7%	26.5%	70.8%

#### ***(e) Frequency of forecast revisions***

Brown, Foster and Noreen (1985) observe that in any one calendar month over the 1976 to 1980 period, only a minority of security analysts revise their earnings forecasts. Foster (1986) reports that these results are relatively robust. He suggests that reasons for infrequent revisions could be because most analysts follow a large number of companies and therefore have limited time to examine one company in detail, and because only a small sample of companies release significant unexpected news in any given month.

#### ***(f) Aggregation of individual forecasts into a consensus forecast***

Coggin and Hunter (1982-1983) compare the forecast errors of consensus analyst forecasts (calculated as an arithmetic mean) to those of individual analyst forecasts for a sample of 149 firms in 1978 and 180 firms in 1979. In both years, they find the consensus analyst forecasts to be more accurate as a predictor of EPS at the 5% level of statistical significance. Foster (1986) explains that individual errors in either direction tend to cancel each other out when they are aggregated into a consensus forecast.

### **2.10.3. Management earnings forecasts**

On occasion, management voluntarily provide the public with earnings forecasts, chiefly in the form of profit warnings and in the form of earnings forecasts for the coming year soon after the latest earnings announcement. Numerous empirical studies confirm that these forecasts possess information content. Patell (1976), for example, finds a significant increase in share return variance at the time of management forecasts. Ajinkya and Gift (1984) as well as Waymire (1984) find a positive relationship between share returns and the unexpected component of the forecasts at the time of announcement.

## 2.11. THE MAINTAINED HYPOTHESIS OF MARKET EFFICIENCY

The assumption of capital market efficiency underlies market-based accounting research. For example, Ball and Brown state in their 1968 study that the empirical test conducted is based on the proposition that “capital markets are both efficient and unbiased in that if information is useful in forming capital asset prices, then the market will adjust asset prices to that information quickly and without leaving any opportunity for further abnormal gain” (p.160).

The results of the vast number of empirical studies in this area are consistent with market efficiency in that the full price reaction generally occurs in anticipation of and at the time of the earnings announcement. However, studies have identified a certain amount of post-announcement drift in share prices, contrary to efficient market theory. Kothari (2001) makes the point that the increasing number of market anomalies being reported may indicate that markets are, in fact, not perfectly efficient. One category already discussed is the post-announcement drift anomaly. Other anomalies include the size, book-to-market, earnings-to-price, momentum, industry, trading volume, long-term contrarian investment strategy, past sales growth, and fundamental analysis effects.<sup>4</sup>

However, Knight (1983) submits that it is not the assumption of complete efficiency in the semi-strong form that is required, but rather the assumption that the market is not excessively inefficient. He argues that it is unlikely that most markets are so inefficient that the lag in price reaction is so great and variant across firms that no conclusion is possible.

This study investigates share price movements on the JSE, an exchange of relatively low efficiency in comparison to larger exchanges such as the NYSE. The implication is that this relatively low efficiency does not detract from the conclusions drawn by the study on the relationship between earnings and share returns.

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<sup>4</sup> The following studies report evidence on the anomalies: Banz (1981) on the size effect; Basu (1977, 1983) on the earnings-to-price effect; Rosenberg et al. (1985) and Fama and French (1995) on the book-to-market effect; Lakonishak et al. (1994) on the sales growth and cash-flow-to-price effects; DeBondt and Thaler (1985, 1987) on the long-term contrarian effect; Jegadeesh and Titman (1993) on the short-term momentum effect; Moskowitz and Grinblatt (1999) on the industry-factor effects to explain the momentum effect; Lee and Swaminathan (2000) on the momentum and trading volume effects; and Lev and Thiagarajan (1993) on the fundamental analysis effect.

## **CHAPTER THREE**

### **REVIEW OF THE JSE SECURITIES EXCHANGE**

The primary research problem that this study addresses is whether the relationship between earnings and share returns observed predominantly on the NYSE also holds on the modern-day JSE. The nature of this relationship may differ due to the JSE having substantially different characteristics to the NYSE. Thus, before the research hypotheses and methodology of this study are discussed, the relevant characteristics of the JSE that distinguish it from other international exchanges are reviewed in this chapter.

#### **3.1. RELATIVE SIZE OF THE JSE**

The JSE started operations in 1887. By the end of 2002, it had grown to a market capitalisation of approximately R 987 billion<sup>5</sup>. In terms of market capitalisation, the JSE is the world's 22<sup>nd</sup> largest exchange, by value of shares traded it is ranked 24<sup>th</sup> in the world and the exchange is ranked 27<sup>th</sup> by number of transactions<sup>6</sup>. The rankings therefore show the JSE to be a relatively small player among the world's stock exchanges. Its market capitalisation is just over 1% and its transaction volume only 0.7% of the NYSE. (World Federation of Exchanges 2003)

#### **3.2. LIQUIDITY AND EFFICIENCY**

As a consequence of the small relative size of the exchange, liquidity is relatively low and thin trading is a characteristic of the JSE. Although liquidity has increased significantly in recent times, as measured by the value of shares traded in relation to total market capitalisation, market liquidity at 35% remains low in relation to major international stock exchanges (Correia and Uliana 2004).

Being a relatively illiquid market, the JSE's share price efficiency is a topic of interest and has been investigated in numerous empirical studies. Bhana (1994) reviews all prior studies of JSE efficiency. Using the findings of these studies, he evaluates the

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<sup>5</sup> Excluding Investment funds

<sup>6</sup> At 31 December 2002, calculated in US dollars



JSE's efficiency by using an efficiency scale that ranges from perfect efficiency to outright inefficiency. The evidence indicates that the JSE is operationally efficient – superior performance is out of reach for all but a few professional investors. The only group of investors that are consistently able to outperform the market are traders of inside information. Market quirks that offer simple rule-of-thumb guidelines are unable to earn abnormal returns. Since this study, liquidity on the exchange has continued to improve as a result of increased foreign investment and the computerisation of trading. Between 1995 and 2002, the number of transactions on the JSE has increased fivefold and the value of shares traded sevenfold (World Federation of Exchanges 2003). The increased number of active traders on the exchange has had a positive influence on its efficiency.

### **3.3. SEGMENTATION BETWEEN RESOURCE AND FINANCIAL & INDUSTRIAL SECTORS**

A unique characteristic of the JSE is its segmentation into two distinct categories of shares, namely resource shares, and financial and industrial shares (Bradfield 2002). Several studies have confirmed the existence of this segmentation, such as Van Rensburg and Slaney (1997). They find that a two factor model, using the JSE All Gold and Industrial indices, provides a more comprehensive explanation of returns on the JSE than a one factor model using the JSE All-Share Index. This dichotomy can be attributed to the history of the South African economy, which was initially dominated by the mining industry. Only later did the financial and industrial sectors develop, creating the observed segmentation. The resource sector is consequently more dominant on the JSE than on other international exchanges.

The factors influencing the risks and returns of resource companies differ substantially to those impacting on financial and industrial companies, with the result that investors often evaluate the JSE's overall performance by separately analysing the performance of these two categories.

### **3.4. JSE DISCLOSURE REQUIREMENTS**

All companies listed on the JSE are required to comply with the disclosure requirements laid down by the JSE. Two of these requirements are relevant to this field of research:

### **3.4.1. Statutory financial reports**

Listed companies on the JSE are required to publish three reports for a financial year – the interim report (first-half results), the preliminary report (summarised annual results) and the annual report (complete financial statements).

The interim report requirement contrasts to the NYSE which requires quarterly earnings publications. Since earnings announcements are more infrequent on the JSE, it follows that it is a less timely source of information. It also follows that more attention is paid to each earnings announcement.

The preliminary report is issued weeks before the annual report. This study considers the date of publication of the preliminary report to be the earnings announcement date. The annual report released in the coming weeks reports the same earnings figures except that more detail is disclosed concerning their composition.

### **3.4.2. Basic and Headline earnings per share (EPS) disclosure**

Companies listed on the JSE must disclose basic EPS in their financial statements. They are also encouraged, but not compelled, to disclose a headline EPS. If they choose not to disclose this, then McGregor Information Services is required to calculate and disclose the figure based on the information available. The figure is thus publicly available to the market.

Basic earnings is calculated as net profit attributable to ordinary shareholders after deducting preference dividends. It measures the overall operational performance of the company as it includes all exceptional items of income and expense that are not expected to recur.

Headline earnings, on the other hand, measures the company's trading performance and thus exclude items of a capital nature. Headline earnings is not necessarily a measure of maintainable earnings, as exceptional trading items (such as large bad debt or inventory write-offs) are still included. Nevertheless, headline earnings is still closer to maintainable earnings than basic earnings. The calculation of headline earnings is designed to be robust (so that two different people will arrive at the same figure if provided with the same information) and factual (adjustments can only be made for amounts actually included in net profit). Headline earnings per share has

therefore become a relevant figure to investors and analysts in valuing shares, and it has been used by the JSE to calculate price-earnings ratios and earnings yields since 1 September 1997.

### **3.5. SOUTH AFRICAN ANALYST FORECAST PUBLICATIONS**

Various information services such as Datastream supply consensus analyst forecasts of earnings per share for many of the companies listed on the JSE. The forecast information is therefore publicly known and sets the expectations for EPS in the coming earnings announcements.

In calculating these forecasts, it is often more difficult for analysts to predict profits and losses that are extraordinary or capital in nature than it is to predict profits from trading. The forecasts are therefore expected to be more closely aligned with headline earnings than with basic earnings.

## **CHAPTER FOUR**

### **RESEARCH HYPOTHESES AND METHODOLOGY**

#### **4.1. RESEARCH HYPOTHESES**

In conducting an empirical analysis into the relationship between accounting earnings and share returns on the JSE, seven hypotheses have been proposed. The following chapter presents each of the seven hypotheses to be tested, and discusses their underlying logic.

##### **4.1.1. Hypothesis one: annual unexpected earnings are positively correlated with abnormal share returns**

Companies whose earnings exceed expectations are expected to exhibit abnormally high share returns over the months leading up to the earnings announcement, and vice versa for companies with earnings below expectations. This association is consistent with the theory that at least some of the new information about a company affecting its share returns is captured in its earnings.

It is important to note that the objective is not to test whether the earnings announcement causes the share price movement, as there are other more timely sources of information over this length of time. Rather, the objective is to establish whether and how quickly earnings captures the new information reflected in share returns over the year.

##### **4.1.2. Hypothesis two: the size of unexpected earnings is positively correlated with the magnitude of abnormal share returns over the year leading up to announcement**

The greater the unexpected earnings, the larger the share returns are expected to be over the year leading up to the announcement. For example, it is hypothesised that significant positive developments relating to a company during a year will cause its share price to rise dramatically due to investors revising their share valuations upwards. At the same time, at least some of this positive development should be captured in its earnings, causing earnings to be considerably higher than originally expected.

#### **4.1.3. Hypothesis three: the annual earnings announcement contains new information**

If actual earnings differs from expected earnings, this is considered to be new information to the market. This new information is expected to *cause* investors to revise their valuations of the relevant company, reflected through abnormal share price movements. Positive announcements are expected to cause share prices to rise immediately after announcement, and vice versa for negative announcements. Note that this differs to hypothesis one, because here it is expected that the announcement provides *new* information that is not yet known to the market and this new information *causes* a share price reaction, rather than there simply being an association between unexpected earnings and abnormal share returns.

#### **4.1.4. Hypothesis four: the size of unexpected earnings is positively correlated with the magnitude of share returns in the days around the announcement**

The greater the unexpected earnings, the larger the share returns are expected to be in the days following the announcement. This is consistent with the logic that the larger the unexpected earnings, the greater will be investors' revision of the intrinsic value of a company's shares. This, in turn, causes a larger share price adjustment.

#### **4.1.5. Hypothesis five: abnormal share returns are not earned after one week following the announcement**

If the JSE is semi-strong form efficient, share prices should adjust immediately to the new information contained in earnings announcements. The new information should have been impounded into the share price within a week of the announcement, with the result that abnormal share returns should not be observed thereafter.

#### **4.1.6. Hypothesis six: headline EPS is significantly more correlated to share returns than basic EPS**

Valuation theories posit that the intrinsic value of a share equals the present value of future expected cash flows. Since headline earnings excludes items of a capital nature, it is closer than basic earnings to maintainable earnings expected in future years. Also, headline earnings is widely used by analysts in company valuations. It is therefore hypothesised that share returns are more closely correlated to headline EPS than to basic EPS.

#### **4.1.7. Hypothesis seven: analyst EPS forecasts serve as a better model of expected earnings than prior year EPS**

The assumption that earnings is expected to remain unchanged from year to year is seen as too simple. It is hypothesised that analyst forecasts of EPS serve as a better indicator of expected earnings as analysts add value by adjusting prior year EPS based on new information available surrounding the relevant company at the time of making the forecast.

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## **4.2. RESEARCH METHODOLOGY**

This empirical study examines the relationship between two variables – unexpected earnings and abnormal share returns. In studying this relationship, three different investigation periods are examined. The association study examines abnormal returns over the nine months leading up to the announcement, the event study examines abnormal returns from two days before the announcement until two days after, and thirdly the post-announcement drift study analyses the sixty days beyond the announcement.

However, in order to study this relationship between the unexpected earnings and abnormal share returns, it is first necessary to develop models to be used to measure the two variables.

### **4.2.1. Models for expected earnings**

An investigation of the market's reaction to unexpected earnings first requires a model for determining the level of expected earnings. This empirical study uses two earnings expectation models:

- (a) random-walk earnings per share (EPS) model, and
- (b) analyst forecast EPS model.

#### ***(a) Random-walk EPS model***

Under this model, the simplifying assumption is made that EPS follows a random walk without drift. Earnings are therefore expected to remain unchanged from year to year. Consequently, the expected EPS equals the EPS announced in the previous financial year-end. This model is referred to as the naive expectations model in Ball and Brown (1968).

#### ***(b) Analyst forecast EPS model***

Analyst forecasts of EPS are available to the public through various information services such as Datastream. Under this model, expected earnings are taken to be the analyst forecast EPS at the start of the investigation period. Two different analyst

forecasts are required – a forecast nine months before announcement for the association study and a forecast just preceding the announcement for the event study.

### ***(c) Inherent problem with the definition of expected earnings***

A problem exists with the earnings expectation models used both in this study and in prior studies. To illustrate the flaw, assume that a positive industry development improves the prospects of all companies in a sector. This results in all companies announcing higher earnings than originally expected (thus placing them all in the 'good news' category). However, some of these companies will report negative abnormal returns (their actual return falls below the sector return) even though their actual returns are higher than originally expected. This problem arises because this study defines 'good news' as actual earnings exceeding the expectation at the *start* of the investigation period. To be correct, the study should rather define 'good news' as actual earnings exceeding expectations relative to the earnings changes of similar companies. Defined in the latter way, those companies whose earnings do not keep up with the sector average (and therefore produce negative abnormal returns) *would* be classified as 'bad news' companies.

Ball and Brown (1968) tried to compensate for this in their regression model but this requires determining an accounting beta which introduces estimation risk. Nevertheless, the fact that this study still produces the expected results indicates that the measure used is still a close approximation of the 'perfect' expected earnings measure.

### **4.2.2. Share portfolio classifications**

Once expected earnings are quantified, unexpected earnings are determined by comparing actual announced earnings to expected earnings. Observations are then grouped into portfolios based on their unexpected earnings:

#### ***(a) Good news and Bad news portfolios***

Companies with actual EPS greater than expected are classified in the 'good news' portfolio while companies with lower EPS than expected are classified in the 'bad news' portfolio.



### **(b) Ranked quintiles**

The sample of 270 events are ranked into quintiles based on the magnitude of their unexpected earnings. The magnitude of unexpected earnings is calculated as the difference between actual and expected EPS as a percentage of actual EPS, as done by Foster, Olsen and Shevlin (1984). The formula is as follows:

$$U(EPS_{it}) = \frac{EPS_{it} - E(EPS_{it})}{|EPS_{it}|}$$

where  $U(EPS_{it})$  is the unexpected percentage EPS,

$EPS_{it}$  is the actual announced EPS, and

$E(EPS_{it})$  is the expected EPS, for share  $i$  in period  $t$ .

It is worth noting that there are two drawbacks with the above formula. Firstly, if actual earnings (the denominator) is a small number, the resulting percentage will appear inflated relative to its expected information content. The second problem arises when expected earnings is positive but actual earnings is negative. Assume that expected earnings is 5 cents per share. If the actual earnings is –5 cents per share, this decrease of 10 cents results in unexpected earnings of –200% ( $-10/5$ ). However, if actual earnings is –10 cents (a greater decrease of 15 cents), unexpected earnings is then –150% ( $-15 / 10$ ), a smaller percentage.

Of the 270 observations, only eleven had a headline EPS below 20c per share, of which three were negative. These observations would thus not have a significant impact on the study's results. The observations were not extracted so as to maintain the randomness of the selected sample, although the shortcoming is recognised.

### 4.2.3. Measurement of abnormal returns

Having determined unexpected earnings, it is necessary to specify a model for measuring abnormal share returns.

#### **(a) Calculation of abnormal share returns**

The abnormal share return is calculated as follows:

$$ar_{it} = r_{it} - r_{mt}$$

where  $r_{it}$  represents the raw return on share  $i$  in period  $t$  and  $r_{mt}$  is the return on the market in period  $t$ . In calculating the returns, price changes are adjusted for all capitalisation issues and share splits. In addition, cash dividends are also taken into account so as to provide an accurate measure of overall return.

It is clear from the equation that the model does not make any adjustment for the systematic risk of individual shares. The Financial Risk Service calculates and publishes share betas relative to the JSE All Share Index as well as the Financial and Industrial Index and Resources Index. However, upon collection of betas for each company at the start and end of the investigation period, it was observed that the betas for numerous companies in the sample fluctuated substantially over this six-year period. The lack of stability makes it difficult to determine a suitable beta. The increased estimation risk of trying to select a beta would not add any rigour to the abnormal share return calculation. The assumption is therefore made that betas are equal to one to prevent any unrealistic distortions.

#### **(b) Selection of market proxy**

Since no beta adjustment is made for the systematic risk of share returns relative to market returns, the FTSE/JSE All Share Index is considered too broad to be used as a suitable market proxy without adjustment. Instead, the JSE has been divided into ten economic groups, consisting of shares in similar areas of the economy. Economic groups are broader than sectors, and have been used as the market proxy. Sector indices were not used, as the problem on the JSE is that certain sectors are dominated by one or two large companies that drive the sector index movement. The broader economic group classification is used to mitigate this problem. Total return indices are

available for each of the economic groups, which enables the study to use this as the market proxy.

Appendix B provides a breakdown of the ten economic groups on the JSE as well as the ticker codes of all the companies from the selected sample within each economic group.

### ***(c) Alternative cumulation approaches***

Two commonly used approaches have been used in the literature to cumulate abnormal share returns over an investigation period, namely the cumulative abnormal return (CAR) and the abnormal holding period return (AHPR).

#### *Cumulative Abnormal Return (CAR)*

Numerous studies, including Foster, Olsen and Shevlin (1984) use the CAR approach to cumulate abnormal returns using the following formula:

$$CAR_t = \frac{1}{n} \sum_{i=1}^n \sum_{t=1}^w ar_{it}$$

where  $ar_{it}$  is the abnormal return of share  $i$  in period  $t$ ,

$w$  is the number of time periods, and

$n$  is the number of shares in the portfolio.

The portfolio CAR is obtained by calculating the simple arithmetic average of the abnormal returns relating to each time period, and then summing these time period returns over the investigation period. In doing so, the CARs ignore the effects of compounding. Consequently, the returns are not a true reflection of the returns an investor could have earned over a period. The bias becomes increasingly severe as time period  $t$  increases. This study uses daily return periods, creating the potential for considerable bias if the CAR approach is used.

### *Abnormal Holding Period Return (AHPR)*

The holding period return (HPR) approach, also known as a buy-and-hold strategy, is another widely used method of measuring returns. In calculating the abnormal component, the HPR of each share needs to be calculated:

$$HPR_{iw} = \prod_{t=1}^w (1 + r_{it})$$

As shown in the equation above, the HPR for each share is the geometric mean of the daily returns of share  $i$  for  $w$  days. The next step involves calculating the HPR of the market proxy over the same period. The same formula as the one above is used, except that the market return  $r_{mt}$  replaces the share return  $r_{it}$ :

$$HPR_{mw} = \prod_{t=1}^w (1 + r_{mt})$$

The portfolio abnormal holding period return (AHPR) for  $w$  days is calculated by taking the arithmetic mean of the individual share AHPRs, as performed by Barber and Lyon (1997):

$$AHPR_w = \frac{1}{n} \sum_{i=1}^n (HPR_{iw} - HPR_{mw})$$

Unlike CARs, AHPRs do take the effects of compounding into account and thus give a more accurate return for any period. As a result of compounding, AHPRs would tend to overstate CARs. However, Barber and Lyon (1997) show that this is not the case if the individual share returns are significantly more volatile than the market.

Since the use of AHPRs results in the calculation of a more accurate, bias-free return, this method has been selected to cumulate share returns in the study.

#### ***(d) Effect of simultaneous dividend announcements***

The effect on abnormal returns of simultaneous dividend and earnings announcements has not been adjusted for in this study. Dividend announcements have also been shown to convey new information to the market. When both announcements occur at the same time, the abnormal return may therefore be affected by both factors. However, this is not necessarily problematic as higher earnings may result in a higher dividend being declared, and vice versa. Share price reactions relating to simultaneous dividend announcements may therefore often be in the same direction.

#### **4.2.4. Preliminary statistical assumption of normality**

In order to determine whether parametric or non-parametric statistical tests should be used, the sample's probability distribution must be ascertained. The sample means in this study consist of the sum of a large number of observations, each of which is a random variable. By the central limit theorem, the sample means are therefore normally distributed if the samples are large enough, even if the population from which the samples is selected are not normally distributed. Only 30 observations are required to make this assumption. (Bradfield and Underhill 1994). As discussed in under section 4.3 (Collection of data), a much larger sample of 270 observations is used in this study.

To verify that the samples of returns are normally distributed, the chi-square goodness-of-fit test is performed. The null and alternate hypotheses are:

$H_0$ : The sample is normally distributed

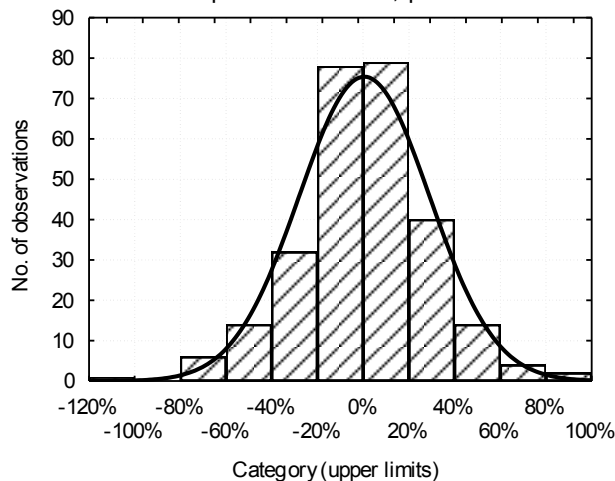
$H_1$ : The sample is not normally distributed

For the AHPR [-195,-1] sample (abnormal returns earned from 195 trading days before announcement to one day before announcement), a p-value of 0.18 is obtained and for the AHPR [-2,+2] sample (abnormal returns earned from two days before announcement to two days after announcement), a p-value of 0.12 is obtained. For both samples, the null hypothesis cannot be rejected even at the 10% level of significance. It is therefore concluded that the samples are normally distributed. The actual and expected normal return distributions are illustrated in figures 3 and 4.

Since returns are normally distributed, parametric statistical tests are used. The advantage of parametric tests over non-parametric tests is that they are more 'powerful' in that for similar sample sizes and significance levels, confidence intervals are narrower and null hypotheses would therefore be rejected more often when they are false.

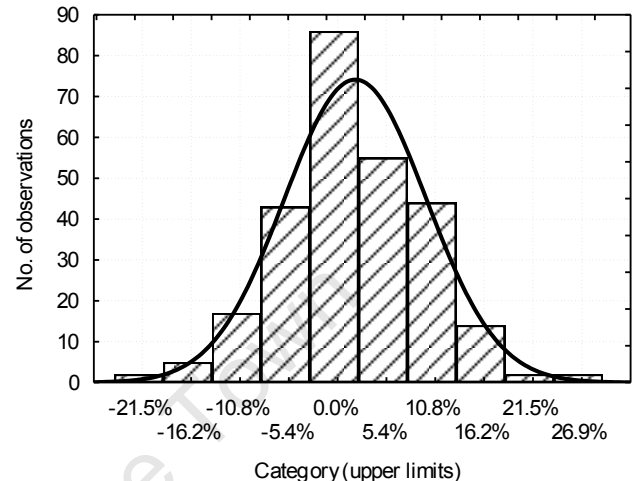
**Figure 6: Distribution of AHPR [-195,-1]**

Chi-Square test = 6.24, p = 0.182



**Figure 7: Distribution of AHPR [-2,+2]**

Chi-Square test = 7.27, p = 0.122



### **4.3. COLLECTION OF DATA**

This section outlines the data collection procedure and ends with a discussion of the limitations on the collection of data.

#### **4.3.1. Data collected**

For each company selected, the following data was collected:

- date of preliminary earnings announcement,
- published basic EPS,
- published headline EPS,
- analyst forecast EPS both nine months before announcement and one month before announcement,
- daily share returns, and
- daily sector index returns.

#### **4.3.2. Sources of data**

- Datastream Information Service supplied analyst forecasts of EPS as well as daily share returns and sector index returns.
- McGregors BFA provided basic and headline EPS figures.
- Earnings announcement dates were obtained from Datastream and McGregors BFA.
- The Finance Research laboratory at the University of Cape Town provided significant assistance with the collection of the required data.

#### **4.3.3. Sample selection**

The sample of 51 companies was selected based on their meeting the following criteria:

- (i) listed on the JSE, and
- (ii) analyst forecasts of EPS available since 1 January 1996.

After selecting the sample of companies, data was collected for the 1997 to 2002 financial year ends, subject to meeting the following criteria:

- (i) share return data and announcement date available for the relevant financial year,
- (ii) twelve-month financial year (i.e. data omitted if the year-end date changed), and
- (iii) earnings denominated in South African Rands.

A total of 270 observations were obtained from the selection process.

#### **4.3.4. Limitations on data collected**

##### ***(a) Procedures for removal of inconsistent data***

To ensure the integrity of the data collected, more than one source was used if available. Earnings announcement dates were obtained from both Datastream and McGregors BFA. On occasion, the announcement dates reported by the two services differed by one or two days. In such instances, the earlier date was used. Where the announcement dates differed by three days or more, the observation was excluded from the study.

Headline EPS figures obtained from McGregors BFA were checked against headline EPS figures published by Datastream. Where the figures differed, these observations were excluded from the study.

##### ***(b) Limitations due to the availability of analyst EPS forecasts***

Analyst forecasts of EPS are provided by Datastream on a daily basis. However, an observed time lag of between one and three months exists following an earnings announcement before the forecast is revised. This delay is due to analysts taking time to submit their revised forecasts to the information service. It was consequently decided to use forecasts nine months prior to the coming earnings announcement to allow sufficient time for the forecasts to adjust.

Secondly, back-dated analyst forecast data is only available on the first day of each month. Thus, a “one month analyst forecast” refers to the forecast on the first day of



the month in which earnings is announced (the most recent available forecast before announcement), and similarly a “nine month analyst forecast” refers to the first day of the ninth month prior to announcement.

Since the association study uses the analyst forecast nine months before announcement, abnormal returns also need to be examined over a nine month period. This works out to approximately 195 trading days, which is therefore the start of the association study’s investigation period.

***(c) Inherent bias in sample selection***

Since information is generally only available on larger companies and on companies that have survived over the period of investigation, a bias may exist in the selected sample of 270 observations. However, the focus of this investigation is intended to be on larger companies whose shares are more thickly traded as this is the focus of the market. The bias is therefore not problematic.

## **CHAPTER FIVE**

### **DISCUSSION OF EMPIRICAL FINDINGS**

In examining abnormal share returns in the period around the annual earnings announcement date, essentially three different types of studies are conducted.

- (1) The *association study* examines share returns over the nine month period leading up to the announcement date to determine whether an association exists between abnormal returns and unexpected earnings. As stated previously, the objective is not to test whether the earnings announcement causes the share price movement, as there are other more timely sources of information over this length of time. Rather, the objective is to establish whether and how quickly earnings captures the new information reflected in share returns over the year.
- (2) The *event study* examines share returns on the date of the announcement. The objective of such a study is to determine whether the annual earnings announcement conveys new information to the market. Abnormal share returns at the announcement date would provide evidence of the announcement causing investors to revise their valuations of the relevant company.
- (3) The *post-announcement drift study* investigates whether abnormal returns can be earned in the period beyond the announcement. Evidence of such drift would indicate that the market is not perfectly efficient.

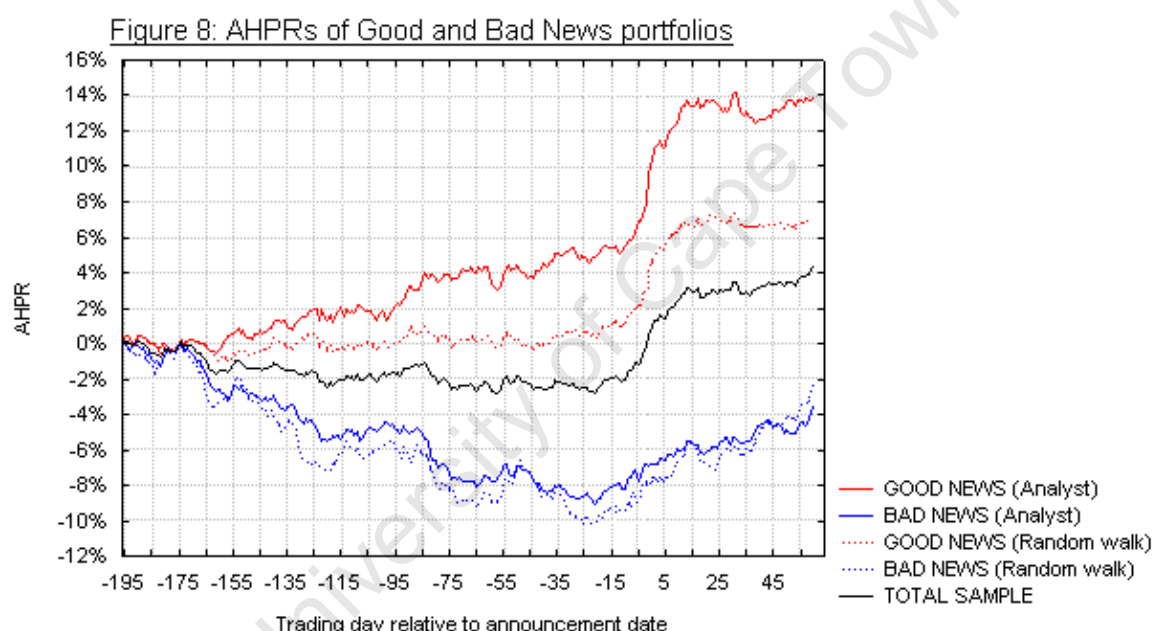
In the chapter that follows, the findings of the study are discussed separately under each of the three major categories outlined above.

## 5.1. ASSOCIATION STUDY

The association study investigates the relationship between abnormal share returns and unexpected earnings over 195 trading days leading up to the announcement date (approximately nine months). Headline EPS is used as the earnings measure. The analyst nine-month EPS forecast is used as the predominant measure of expected earnings, although the random-walk model (prior year EPS) is also discussed.

### 5.1.1. 'Good News' and 'Bad News' portfolios

Portfolios have been formed based on the sign of unexpected headline EPS (positive or negative) using both earnings expectation models, as illustrated in figure 8.



#### (a) Analyst Forecast Model as Expected Earnings

A definite correlation between the sign of unexpected earnings (good news versus bad news) and abnormal holding period returns (AHPRs) is observed, as illustrated in the figure. Over the nine month period leading up to the earnings announcement, the 'good news' portfolio generates a mean positive abnormal return of 9.58% and the 'bad news' portfolio a mean negative abnormal return of 6.94%.

The results are consistent with those of Ball and Brown (1968) and consistent with the hypothesis that at least a portion of the information causing investors to revise their share valuations is being captured in the annual earnings figure. Numerous information sources other than the annual earnings announcement are available to investors during the course of the year, including press releases, analyst forecasts and interim reports. As good or bad news surrounding the companies becomes known from such sources, so company share prices are revised upwards or downwards. Since a strong correlation is found to exist between abnormal share returns and unexpected annual earnings, it indicates that the methods used by accountants to measure earnings are appropriate – the new information causing share price revisions is being captured by accountants in their measurement of annual earnings. The implication is not that the information is timely, but rather simply that earnings is measured in such a way as to provide useful information to investors.

#### ***(b) Random-walk model as Expected Earnings***

When prior-year headline EPS is used as the expected earnings to form the good and bad news portfolios, a positive association between abnormal returns and unexpected earnings is observed, as when analyst EPS forecasts are used. However, the degree of association appears to be weaker when the random-walk model is used. The 'bad news' portfolios produce similar abnormal returns using both models. However, this weaker association is visible in the 'good news' portfolio, which generates positive abnormal returns of a lower magnitude over the pre-announcement period when the random-walk model is used.

Lev and Ohlson (1982) help to interpret this finding when they make the point that a substantial body of research demonstrates the positive correlation between unexpected earnings and share returns. Since this relationship does therefore exist, they conclude that the abnormal return measure is thus rather an indicator of the quality of the earnings expectation model. Since the analyst forecast model produces abnormal returns of a larger magnitude than the random-walk model, it can be concluded that the analyst forecast model is a better model of expected earnings. This interpretation is consistent with the logic that analysts have both the timing advantage of being able to incorporate recent information in the three months since the last earnings announcement, as well as the advantage of having access to a wider base of information than simply past earnings.

Interestingly, Ball and Brown (1968) did not find significant differences between the overall quality of their regression and naive earnings expectation models – the naive model was found to be best for the ‘bad news’ portfolio, while the regression model was best for the ‘good news’ portfolio. Their study did not, however, use analyst forecasts as a model of expected earnings.

***(c) Phases of abnormal return movements over the pre-announcement investigation period***

Since the analyst EPS forecast model is considered to be the predominant measure of expected earnings in this study, the analysis that follows is based on the analyst nine-month EPS forecast as the expected earnings.

The cumulative abnormal return movements can be divided into three fairly distinct phases. In the first phase, which runs for the first 20 trading days from the start of the investigation period, the abnormal returns of both portfolios largely tend to stick together. The second phase, which runs from day –175 through to approximately day –25, sees a continual divergence of the two portfolios from one another, the ‘good news’ portfolio in a positive direction and the ‘bad news’ portfolio in a negative direction. The third phase occurs in the month leading up to the announcement date, when both portfolios generate fairly significant positive abnormal returns.

In phase one (the 20 days from day –195 to day –176), the fact that the portfolio abnormal returns do not diverge seems to indicate that there is a lack of price-sensitive company information at this early stage. New information relating to the future prospects of the companies has not yet become available to investors to enable them to distinguish between the good and bad companies.

In phase two (from day –175 to day –25), the divergence in abnormal returns appears to occur relatively constantly over the 150 day trading period (the majority of the pre-announcement investigation period). The AHPR of the ‘good news’ portfolio increases fairly steadily (by 4.82%), while the AHPR of the ‘bad news’ portfolio decreases steadily (by 8.61%). This drift was also observed by Ball and Brown (1968), and indicates that price-sensitive information from a variety of sources (including the interim earnings announcement) flows into the market fairly evenly with the passing of time, allowing a gradual and continual share price adjustment as the new information is impounded into share prices. With a ‘good news’ share, for example, new information

that enhances the future prospects of the company is continually entering the market, causing a continual upward drift in its share price.

Phase three begins in the month prior to the annual earnings announcement. The first observation in this period is that fairly significant abnormal returns are generated in both portfolios. The increase in the magnitude of abnormal returns can be explained by the fact that the market starts to take a keener interest in estimating the company's performance over the past year as the announcement date nears. The annual earnings announcement is an important event in the company's calendar – it is the medium through which the company reports to the public on its past performance, and this information is used by investors to revise their share valuations based on the expected future prospects of the company. It is therefore not surprising to observe increased share activity in the days leading up to this important event.

The second noteworthy observation in phase three is that both portfolios generate positive abnormal returns over this period (although the 'good news' returns are larger in magnitude). This finding is inconsistent with Ball and Brown (1968), who find their 'bad news' portfolio to generate significant negative returns in the final month. Although the observation in this study could simply be specific to the sample selected, it could also imply a degree of market inefficiency. Over the last 21 trading days (approximately one month) leading up to announcement, the 'bad news' portfolio generates a positive abnormal return of 2.13%.

This indicates that investors perhaps realise on closer inspection that they were overly pessimistic regarding the bad news surrounding these companies and therefore revise their share valuations up slightly before the announcement date. This suggestion that the South African market is pessimistic was first proposed by Knight (1983), who observed positive abnormal returns in his 'bad news' portfolio in the week of the annual earnings announcement. This is an apparent inefficiency that provides investors with an easy trading rule to earn abnormal returns. Further research would be required on a different set of data to ascertain whether or not these results are specific to the sample, though.

However, it is also worth mentioning that over the final month, the 'good news' portfolio does still outperform the 'bad news' portfolio (in the last 21 days, it generates an abnormal return of 4.54% compared to 2.13% for the 'bad news' portfolio). The 'bad

news' portfolio is therefore still underperforming relative to the total sample. The total sample should in theory have a zero abnormal return. The fact that its return is positive contributes to the distortion in the 'bad news' abnormal returns, and could be caused by two factors – a survivorship bias in the sample, as well as the small firm effect in the measurement of abnormal returns. Since the sample only consists of companies that have survived over the investigation period, the abnormal returns have an upward bias. Secondly, it is well-documented that smaller firms tend to generate higher abnormal returns than larger firms (known as the small firm effect). The good and bad news portfolios weight the abnormal returns of large and small firms equally. However, the sector indices (used as market proxies in the abnormal return calculation) are weighted by market capitalisation, thus reducing the weighting of smaller firm returns. The positive abnormal return reaction of the total sample may therefore be due to the fact that smaller firms, generating higher returns, are weighted equally in the 'good news' and 'bad news' portfolios, but have a reduced weighting in the sector index return.

#### ***(d) Information content of interim earnings announcements***

Half-year results are published by companies listed on the JSE in the interim report. This report is a potentially important information source in helping to forecast annual earnings for two reasons – firstly, the interim earnings figure makes up approximately half the annual figure, and secondly, the remaining time horizon left to forecast is shortened to only six months rather than a full year.

Being an important information source, the announcement of the interim report is expected to produce abnormal returns. In this study, interim announcement dates were not collected and an accurate event study can therefore not be conducted. However, the interim announcement should on average occur six months prior to the annual earnings announcement. Since there are approximately 260 trading days in a year, the abnormal returns in the period around trading day –130 (midway through the year) can be examined for evidence of information content. The period from day –135 to day –125 is examined to allow for the interim announcements being a week early or a week late.

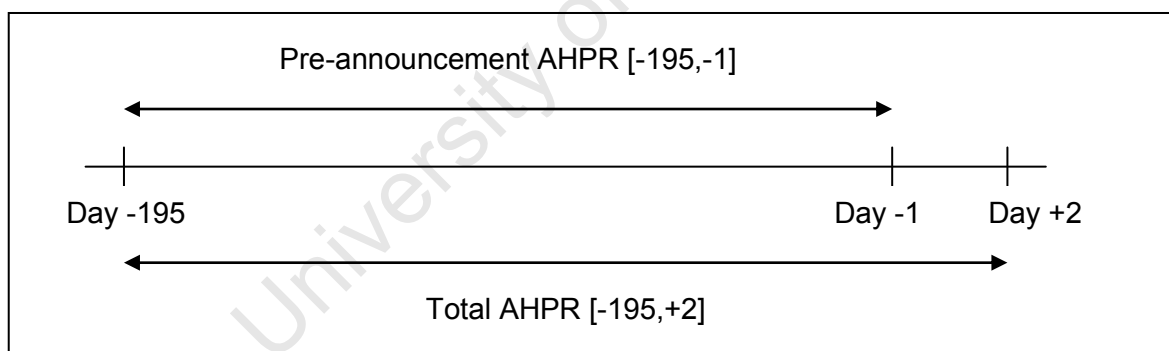
The AHPR [-135,-125] is calculated as 0.91% for the 'good news' portfolio and –1.00% for the 'bad news' portfolio. Although the abnormal returns are in the expected directions, the magnitudes are relatively small when compared to the abnormal returns

at the time of the annual earnings announcement (discussed later). Based on these results, it is therefore tentatively concluded that the interim earnings announcement contains a lower degree of new information than the annual earnings announcement, although the shortcoming of not having the exact interim announcement dates does affect the strength of this conclusion. This finding is consistent with Knight (1983), who found the information content of the interim announcement to be lower than that of the annual earnings announcement.

**(e) Pre-announcement abnormal returns relative to total abnormal returns**

The annual earnings announcement contains useful information, seen through the correlation between unexpected earnings and abnormal share returns. However, an analysis of when these abnormal returns are generated provides information as to the timeliness of the annual earnings announcement relative to other information sources. The table below splits the total abnormal return into the return generated at announcement versus in the pre-announcement period. The concept is illustrated in figure 9.

Figure 9: Measurement method of pre-announcement AHPRs relative to total AHPRs



Three different dates are used to make this split – day –1 (the day before announcement), day –3 and day –6. This is done to detect any potential share return impacts from information leakage in the days before the announcement.



<b>TABLE 4</b> <b>Mean pre-announcement AHPRs of Good and Bad News Portfolios relative to AHPR [-195,+2]</b>				
Trading day relative to announcement date	Good News		Bad News	
	AHPR	Pre-announcement AHPR as % of AHPR [-195,+2]	AHPR	Pre-announcement AHPR as % of AHPR [-195,+2]
-195 to +2	11.23%	100%	-6.83%	100%
-195 to -1	9.58%	85%	-6.94%	98%
-195 to -3	7.59%	68%	-6.75%	99%
-195 to -6	6.32%	56%	-7.14%	95%

Since the purpose of the above calculations is to determine the amount of information impounded by a certain date relative to the total information content, the resulting percentages calculated cannot be greater than 100%. Thus, although the 'bad news' portfolio pre-announcement AHPRs for periods [-195,-6] and [-195,-1] exceed the total AHPR [-195,+2], the percentages still fall below 100% by the difference between the pre-announcement AHPR and the total AHPR, as a percentage of the total AHPR.

The results, tabulated above, show the annual earnings announcement not to be a particularly timely information source. By the day before the announcement, 85% of the abnormal share reaction has occurred in the 'good news' portfolio and 98% in the 'bad news' portfolio. Ball and Brown (1968) report an 85% to 90% reaction leading up to the announcement. It therefore appears as though South Africa's alternative information sources are comparable or even superior to those sources available to NYSE investors at the time of the Ball-Brown study.

This finding is not expected because interim earnings announcements, an important information source for establishing expected annual earnings, are made on a quarterly basis in the US but only half-yearly in South Africa. It would therefore be expected that more importance would be placed on the annual earnings announcement in South Africa, but this is not observed. This observation could be attributed to dramatic improvement in information flow as a result of computerisation – information has become substantially more accessible over the last four decades since the Ball-Brown study, with the result that investors are now able to obtain price-sensitive information from alternative sources with far greater ease than was possible previously. The substantial improvement in information technology could therefore have counteracted the fact that interim announcements are made less frequently on the JSE.

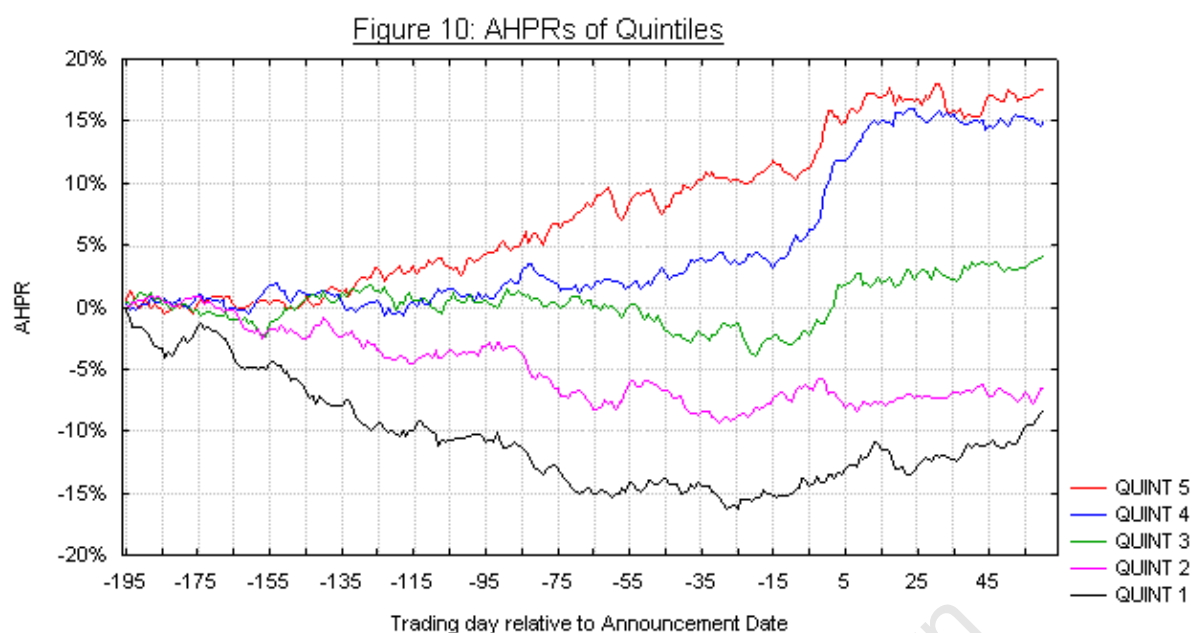
Importantly, the results also show an asymmetry between the timeliness of annual earnings information relating to 'good news' and 'bad news' shares. It appears as though the market has largely impounded bad news before announcement occurs whereas good news requires hard information (through an earnings announcement) for the market to react positively. This finding supports the argument that the South African market is pessimistic. Such a reaction was also found by Knight (1983) in his study on the JSE two decades earlier.

The figures show a large percentage (29%) of the 'good news' portfolio's total abnormal returns to occur in the week before announcement, whereas the 'bad news' portfolio does not exhibit large abnormal return changes in this period. This finding suggests that bad news is largely impounded into share prices well before announcement. It also seems to indicate that there is either substantial information leakage prior to 'good news' firms announcing their earnings, or simply that investors are correctly able to adjust their earnings predictions in the week before announcement.

#### **5.1.2. Quintiles ranked by size of unexpected earnings**

The size of unexpected headline EPS has been calculated for each of the 270 observations in the total sample, using the formula provided on page 38 (using the analyst nine-month forecast as the expected earnings). Based on the size of unexpected earnings, the total sample is divided into quintiles of 54 observations each. Quintile 1 contains the 54 observations with the most negative unexpected headline EPS, and so forth up to quintile 5, which contains the 54 observations with the most positive unexpected headline EPS. By examining the abnormal returns generated by each quintile, the relationship between the size of unexpected earnings and abnormal share returns can be determined.

Grouping observations into quintiles has the advantage of minimising the distortions in results that could be caused by outliers. In a portfolio of 54 observations, the abnormal return outliers in either direction tend to cancel each other out, enabling a relatively reliable analysis to be performed on the overall quintile abnormal returns relative to each other.



Over the nine months preceding the announcement date, the quintiles are found to be perfectly ranked by the magnitude of their abnormal share returns, as illustrated in figure 10. This finding is consistent with the hypothesis that the greater the unexpected earnings, the larger the abnormal share returns. This reinforces the conclusion that accounting earnings is measured in an appropriate manner – more significant information, that causes greater share price revisions among investors, is captured in accounting earnings through a greater change in the reported figure.

In analysing quintile returns, it is useful to examine the range of unexpected headline EPS within each quintile. This information, as well as the mean and median AHPRs, are provided in table 5.

<b>TABLE 5</b>					
<b>Quintile information (based on analyst nine-month EPS forecast)</b>					
	<b>Quint 1</b>	<b>Quint 2</b>	<b>Quint 3</b>	<b>Quint 4</b>	<b>Quint 5</b>
<b>Unexpected Headline EPS</b>					
Mean	-162.4%	-16.3%	-2.3%	5.5%	67.9%
Median	-69.0%	-14.4%	-1.8%	4.9%	18.8%
Lower extreme	-3133.3%	-32.3%	-7.4%	2.2%	10.5%
Upper extreme	-32.4%	-7.8%	1.9%	10.3%	2344.4%
<b>AHPR</b>					
Mean AHPR [-195,-1]	-14.18%	-5.99%	-1.24%	9.43%	14.60%
Median AHPR [-195,-1]	-12.18%	-3.87%	-1.45%	11.04%	15.86%

It is evident from figure 10 and the AHPRs provided in table 5 that only quintiles 4 and 5 produce positive abnormal returns over the pre-announcement period. An analysis of each quintile's unexpected earnings reveals that quintiles 4 and 5 are in fact the only portfolios with positive mean and median unexpected earnings. This is consistent with there being a positive correlation between unexpected earnings and abnormal share returns.

An interesting observation relates to the timing of the dispersal of each quintile's cumulative abnormal returns from one another. Figure 10 clearly shows the returns of quintile 1 (with the most negative abnormal returns) to break away first and continue on a downward trend for the majority of the nine-month investigation period. The figure shows quintile 1's cumulative abnormal return to fall rapidly to  $-4.04\%$  within the first 12 trading days of the investigation period. The general downward trend continues over the following months until reaching an AHPR of  $-16.23\%$  by day  $-25$  (25 trading days prior to announcement).

This may be explained by the fact that negative publicity (such as a strike) is often more easily observable and tends to receive more attention in the financial press than positive publicity. Positive news, such as growth in market share or sales, is by its nature less easily observable before financial results are published. This could be a reason why the market appears pessimistic in its expectation of earnings.

An example illustrating the market's bias towards requiring bad news is the profit warning requirement – only if management expect profits to be lower than expected by the market (rather than higher than expected) does a public announcement need to be made. Since the market therefore tends to focus more on bad news than good news, it is expected that bad news is impounded more quickly into the share prices of the poorest-performing companies. This is seen through the relatively fast downward adjustment in the abnormal returns of quintile 1.

This theory that bad news receives more attention in the market is supported by the observation that the next quintile observed to break away is quintile 2, the portfolio with the second-worst unexpected earnings. The AHPR of quintile 2 tends to stay close to the others until approximately day  $-158$ , when its abnormal return starts to separate negatively from quintiles 3, 4 and 5. Quintile 2 companies are exposed to less severe bad news in the market than companies in quintile 1, explaining why the negative drift

in abnormal returns is only observed several weeks later. Nevertheless, the fact that it is the next quintile to break away indicates the market's preoccupation with bad news.

Quintile 5, containing the firms with the largest positive unexpected earnings, is the next portfolio to break away. Interestingly, this is observed to occur around day -133. This is almost exactly six months before the annual earnings announcement, and is therefore the time around which the interim financial results are published. It makes sense for positive abnormal returns to increase after the interim announcement. This is because the publication of half-yearly results provides the first source of hard evidence that the firms in quintile 1 are performing significantly better than expected. As already discussed, good news is generally less easily observable in the market than bad news. The interim report therefore often represents the first solid confirmation of superior current year performance that can be used by investors to revise their share valuations upwards.

Quintiles 3 and 4 comprise those shares whose actual earnings do not differ substantially from expectations (seen in table 5). It is therefore not surprising that their cumulative abnormal returns stay fairly close together for the majority of the investigation period, until even day -69. These companies are generally performing as expected and their AHPRs do not deviate significantly from zero over this period. However, in the last three months leading up the announcement date, their abnormal returns do begin to deviate as investors start paying more attention to company prospects with the nearing of the annual earnings announcement. Investors are seen to differentiate between firms in quintile 3 and quintile 4 successfully, as seen by the appropriate ranking of the quintiles based on their AHPRs by the time of the announcement.

Another noteworthy observation is that significant abnormal returns are generated in all the quintiles from approximately 15 to 25 trading days before the annual earnings announcement. This finding reinforces the earlier discussion that the market starts to take a keener interest in estimating the company's performance over the past year as the announcement date nears, resulting in increased share price movements.

As with the good and bad news portfolios, the abnormal share return reactions are all in a positive direction. Figure 10 clearly shows that quintiles 1 and 2 generate positive abnormal returns over the last 25 trading days leading up to the announcement date.

The same explanations apply – the observation could be specific to the sample, it could be due to prior market pessimism being corrected, or it could be due to a survivorship bias in the selected sample and the small firm effect in the measurement of abnormal returns.

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## 5.2. EVENT STUDY

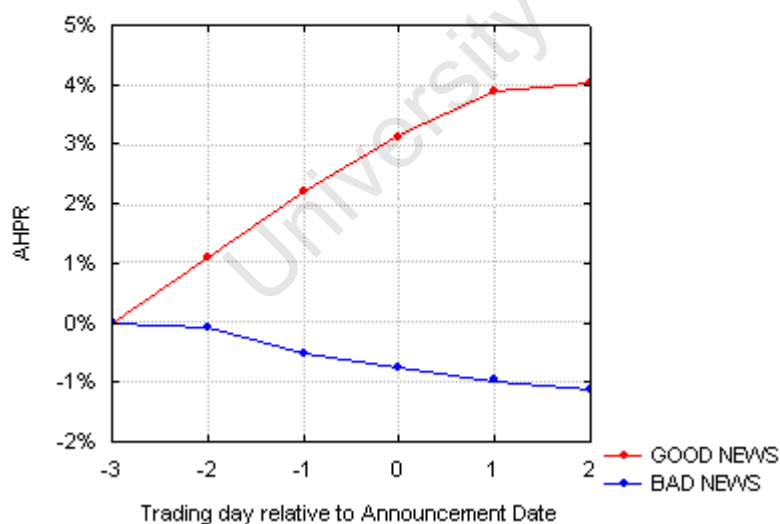
In order to determine whether the annual earnings announcement conveys new information to the market, the event study examines the abnormal returns at the date of the announcement.

### 5.2.1. 'Good News' and 'Bad News' portfolios

#### (a) *Analyst One-month Forecast Model*

Expected earnings were taken to be the analyst EPS forecasts on the first day of the month in which the announcement was made (referred to as a one-month analyst EPS forecast). Good and bad news portfolios were then formed based on whether actual headline EPS was higher or lower than expected. Over the five-day period, from two days before announcement until two days after  $[-2,+2]$ , news of unexpectedly high headline EPS (good news) generated mean positive abnormal returns of 4.03% while bad news generated mean negative abnormal returns of 1.12%. Figure 11 illustrates the abnormal returns around the announcement date.

Figure 11: AHPR $[-2,+2]$  of Good and Bad News portfolios (analyst one-month EPS forecast)



These results are consistent with the logic that share prices respond to new information contained in annual earnings announcements. The consequent positive implication for accountants is that the annual earnings figure does contain new, decision-useful information as it is used by investors to revise their share valuations.

As figure 11 illustrates, the reaction appears to be slightly asymmetrical – a ‘good news’ announcement causes a larger share price reaction than a ‘bad news’ announcement. This is reinforced when the median returns are examined (3.2% for ‘good news’ shares and 0.0% for ‘bad news’ shares). Knight (1983) also finds an asymmetrical reaction to annual earnings announcements on the JSE, except that Knight’s ‘bad news’ portfolio actually generates positive abnormal returns. The conclusion reached by Knight may be applicable in this study as well – that the market is pessimistic in its earnings expectations. Bad news is impounded into the share price to a larger extent than good news, causing larger reactions to good news announcements than to bad news announcements.

However, as discussed previously, the observed asymmetry may in actual fact simply be caused by the survivorship bias in the selected sample, as well as the small firm effect in the measurement of abnormal returns. A counter-argument to this argument of a measurement bias is proposed by Fama (1991, p.1607) who states that “the cleanest evidence on market-efficiency comes from event studies, especially event studies on daily returns. When an information event can be dated precisely and the event has a large effect on prices, the way one abstracts from expected returns to measure abnormal daily returns is a second-order consideration. As a result, event studies can give a clear picture of the speed of adjustment of prices to information.” Therefore, since the time horizon of the event study is only five days, the bias caused by measurement problems is insignificant. The conclusion that the market appears to be pessimistic therefore appears to be the correct one.

A further noteworthy observation is that a significant portion of the abnormal return reaction occurs in the two days prior to the announcement date. The ‘good news’ portfolio generates an AHPR [-2,-1] of 2.19%, representing 54% of the total abnormal return over the five-day period [-2,+2], and the ‘bad news’ portfolio generates an AHPR [-2,-1] of -0.52%, representing 46% of the total abnormal return. This observation may indicate that a degree of information leakage and insider trading is occurring on the JSE. Alternatively, it may also be as a result of legitimate information dissemination in which knowledgeable investors and analysts correctly adjust their expectation of earnings through company analysis and interviews with management.

Finally, the abnormal return movement in the second day after announcement is observed to be close to zero. This indicates that the new information contained in the

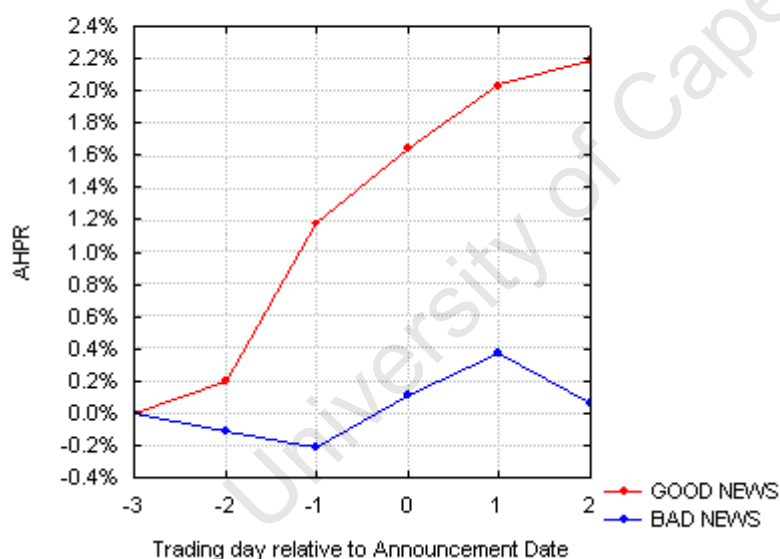


annual earnings announcement is largely impounded into the share price within a day after announcement, as expected in an efficient market.

### **(b) Random-walk model**

The analyst one-month EPS forecast is expected to be a considerably more accurate measure of expected earnings than prior year earnings. As previously discussed, analysts have a considerable timing advantage as well as access to a wider range of information sources. Even so, an analysis of the abnormal returns of good and bad news portfolios has value in that simple trading rules could be developed that only require an analysis of prior year earnings. Figure 12 below plots the cumulative abnormal returns earned by 'good news' and 'bad news' portfolios formed based on the random-walk model.

Figure 12: AHPR[-2,+2] of Good and Bad News portfolios (random-walk model)

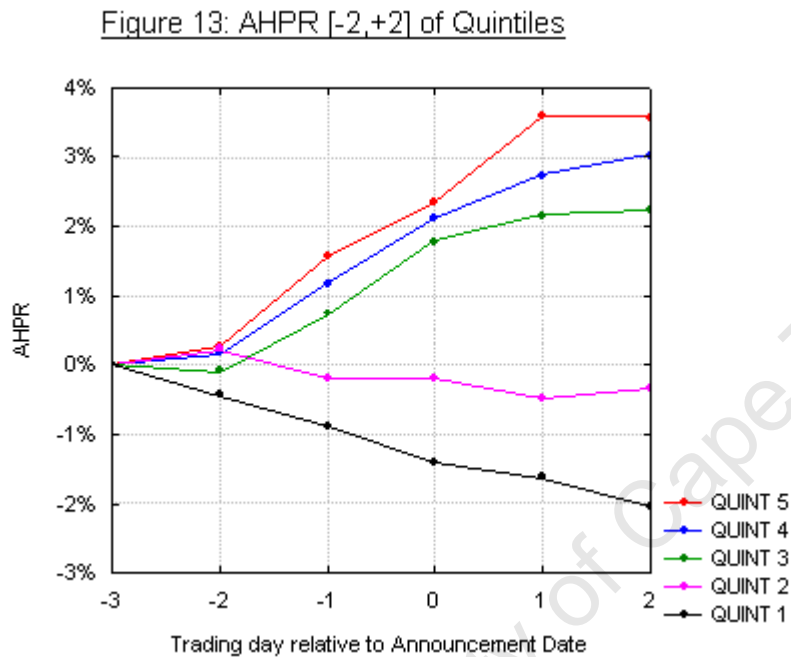


The 'good news' portfolio is found to generate a fairly significant positive abnormal return of 2.19% over the five day period around the announcement date, while the 'bad news' portfolio generates an abnormal return of 0.06%, insignificantly different from zero. These findings support the conclusion that the market is pessimistic as it appears that bad news has already been impounded into share prices whereas good news requires confirmation through hard evidence. Furthermore, the findings indicate that if just before the annual earnings announcement one expects a company's earnings to

be higher than the previous year, then an abnormal return could be earned by buying these shares.

### 5.2.2. Quintiles ranked by size of unexpected earnings

Quintiles are formed based on the magnitude of unexpected headline EPS, using the analyst one-month EPS forecast as expected earnings.



When examining these quintiles over this five-day period (illustrated in figure 13), it is observed that the quintiles are once again perfectly ranked by the magnitude of their abnormal share returns. This finding is consistent with the hypothesis that the larger the earnings surprise, the more significant the new information, and thus the larger the market reaction.

Quintiles 1 and 2 generate negative abnormal returns over this period while quintiles 3, 4 and 5 generate positive abnormal returns. It is therefore expected that negative earnings surprises are produced by quintiles 1 and 2, and positive earnings surprises by quintiles 3, 4 and 5. Inspection of the unexpected headline EPS information provided in table 6 reveals this to be true. This finding is consistent with the expected positive correlation between unexpected earnings and abnormal returns.

<b>TABLE 6</b>					
<b>Quintile information (based on analyst one-month EPS forecast)</b>					
	<b>Quint 1</b>	<b>Quint 2</b>	<b>Quint 3</b>	<b>Quint 4</b>	<b>Quint 5</b>
<u>Unexpected Headline EPS</u>					
Mean	-46.1%	-2.8%	1.7%	6.5%	48.9%
Median	-26.1%	-2.3%	1.5%	6.7%	15.5%
Lower extreme	-587.3%	-7.4%	0.0%	3.7%	9.5%
Upper extreme	-7.6%	-0.1%	3.6%	9.5%	800.0%
<u>AHPR</u>					
Mean AHPR [-2,+2]	-2.02%	-0.26%	2.33%	3.03%	3.74%
Median AHPR [-2,+2]	-2.52%	0.65%	1.20%	2.36%	3.24%

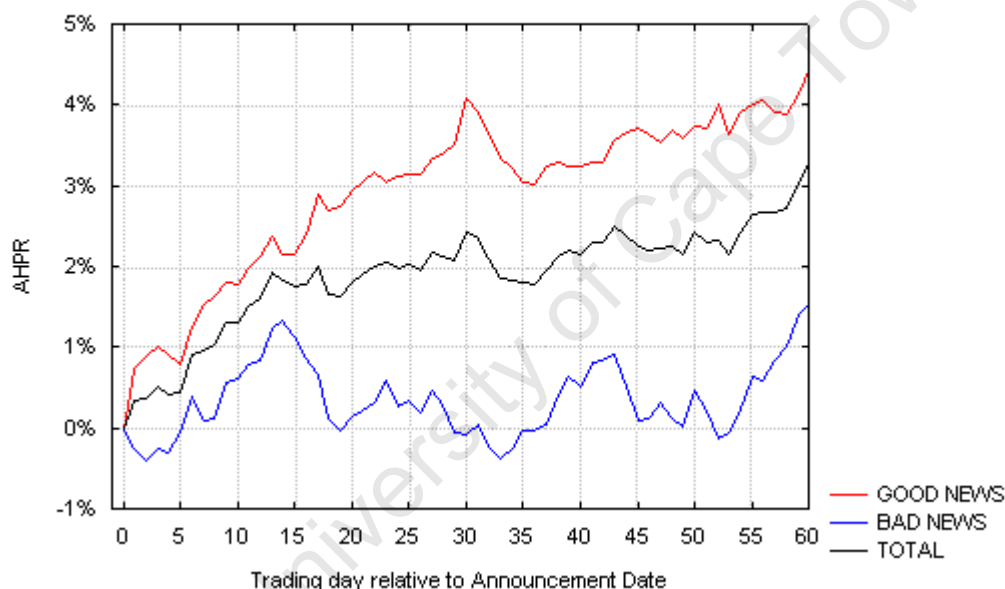
Looking at figure 13, the early market reaction in the two days prior to announcement can once again be observed in the quintile AHPR movements. Furthermore, as with the good and bad news portfolios, the abnormal return movements in the second day after announcement are seen to be relatively flat, indicating that the new information has been impounded fairly rapidly.

### 5.3. STUDY OF POST-ANNOUNCEMENT DRIFT

In an efficient market, share prices should adjust instantaneously to the release of new information (the annual earnings announcement in this case), with the result that no abnormal returns should be observed beyond its release. Evidence of post-announcement drift in share returns would therefore signal market inefficiency.

Good and bad news portfolios are formed based on unexpected headline EPS, using one-month analyst EPS forecasts as expected earnings. The cumulative abnormal returns of each portfolio from the date of announcement until sixty trading days beyond are illustrated in figure 14 below.

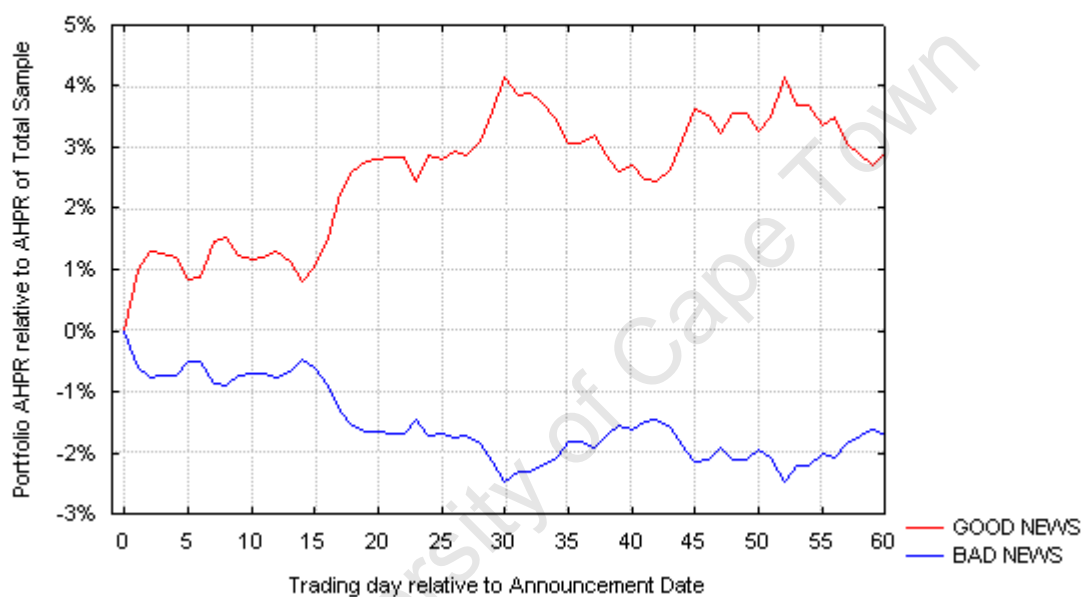
Figure 14: AHPR [+1,+60] of Good and Bad News portfolios



As illustrated in figure 14, there does appear to be some drift in abnormal returns beyond the announcement date, particularly in the 'good news' share portfolio. The portfolio's cumulative abnormal returns are seen to increase steadily in the period beyond announcement, reaching an AHPR of 4.44% on day sixty. This observation is contrary to efficient market hypothesis, that expects there to be no predictable movements in share returns beyond the event date. The 'bad news' portfolio does not appear to exhibit drift, however, with its AHPR fluctuating around the zero return line. After sixty trading days, the portfolio ends on an AHPR of 1.54%.

A problem, however, is that the total sample's abnormal returns drift upwards when it is expected to remain zero. The slow but continual upward drift in its abnormal returns over this period can possibly be attributed to survivorship bias in the selected sample as well as the small firm effect in the measurement of abnormal returns, as explained previously. This upward drift in the total sample may therefore distort the abnormal returns of both the good and bad news portfolios. To remove the effect of this distortion, figure 15 plots the abnormal returns of each portfolio relative to the total sample's abnormal return, rather than relative to zero.

Figure 15: AHPR [+1,+60] of Good and Bad News portfolios relative to AHPR of Total Sample



The figure now clearly shows drift in the abnormal share returns of both portfolios. The 'good news' portfolio drifts upwards, generating an AHPR 2.90% greater than that of the total sample after sixty days, while the 'bad news' portfolio drifts downwards, generating an AHPR 1.73% below that of the total sample. The drift does not appear to persist beyond day 30 in either portfolio, however. These findings indicate market inefficiency as it provides investors with a simple trading rule to earn abnormal returns – take a long position in shares with positive earnings surprises and a short position in shares with negative earnings surprises.

## 5.4. SUMMARY OF FINDINGS

Having discussed the research findings in detail, the following section summarises the key points from this discussion.

The following key findings were identified from the association study:

- A positive correlation is observed between the sign of unexpected earnings (good news versus bad news) and abnormal share returns over the nine months leading up to the annual earnings announcement. This finding is consistent with the hypothesis that a substantial portion of the information causing investors to revise their share valuations is being captured in the annual earnings figure. It indicates that the methods used by accountants to measure earnings are appropriate in that new price-sensitive information is being captured by accountants in their measurement of annual earnings.
- A stronger association between unexpected earnings and abnormal share returns is observed when expected earnings are analyst EPS forecasts rather than prior-year headline EPS. This provides evidence that analyst forecasts are a better expectation of earnings than prior-year earnings.
- The cumulative abnormal return movements over the nine months leading up to the annual earnings announcement provide insight into the flow of new information to the market. The returns of good and bad news portfolios are observed to diverge gradually over the period as price-sensitive information from a variety of sources flows into the market fairly evenly with the passing of time. In the month leading up to announcement, however, both portfolios generate fairly substantial positive abnormal returns. The increase in magnitude can be attributed to the market starting to take a keener interest in estimating the company's annual performance as the announcement date nears. The unexpected positive abnormal return for the bad news portfolio could be sample-specific, it could be due to prior market pessimism being corrected, or it could be due to a survivorship bias in the selected sample and the small firm effect in the measurement of abnormal returns.
- Abnormal share returns at the time of the interim earnings announcement are in the expected directions (a positive return for the 'good news' portfolio and a negative

return for the 'bad news' portfolio). The magnitude of returns is relatively small relative to the annual earnings announcement, consistent with the hypothesis that the interim earnings announcement contains a lower degree of new information than the annual earnings announcement.

- The results show the annual earnings announcement not to be a particularly timely information source. By the day before the announcement, 85% of the abnormal share reaction has occurred in the 'good news' portfolio and 98% in the 'bad news' portfolio. Importantly, the results also show an asymmetry between the timeliness of annual earnings information relating to 'good news' and 'bad news' shares. It appears as though the market has largely impounded bad news before announcement whereas good news requires hard information (through an earnings announcement) for the market to react positively.
- Quintiles formed based on the size of unexpected earnings are found to be perfectly ranked by the magnitude of their abnormal share returns. This finding is consistent with the hypothesis that the greater the unexpected earnings, the larger the abnormal share returns. This reinforces the conclusion that accounting earnings is measured in an appropriate manner – more significant information that causes greater share price revisions among investors is captured in accounting earnings through a greater change in the reported figure.

The following key findings were identified in the event study:

- A positive correlation is observed between the sign of unexpected earnings (good news versus bad news) and abnormal share returns at the date of the annual earnings announcement. This finding is consistent with the logic that share prices respond to new information contained in annual earnings announcements and that the annual earnings figure does contain decision-useful information.
- The reaction appears to be slightly asymmetrical, with a 'good news' announcement causing a larger share price reaction than a 'bad news' announcement. This provides further evidence of the market appearing to be pessimistic in its earnings expectations.

- A significant portion of the abnormal return reaction occurs in the two days prior to the announcement date. This may be caused either by information leakage and insider trading or by legitimate market anticipation of earnings.
- Quintiles formed based on the size of unexpected earnings are again found to be perfectly ranked by the magnitude of their abnormal share returns at the announcement date. This finding is consistent with the logic that the larger the earnings surprise, the more significant the new information, and thus the larger the market reaction.

The post-announcement drift study revealed the following key finding:

- Contrary to the efficient markets hypothesis, drift in abnormal share returns is observed for at least 30 trading days beyond the announcement date, with the 'good news' portfolio drifting upwards and the 'bad news' portfolio drifting downwards.

These key findings, in conjunction with the hypothesis testing results in the following chapter, are used to draw the conclusions that are discussed in Chapter Seven.



## **CHAPTER SIX**

### **TESTS OF HYPOTHESES**

Following on from the detailed discussion of the empirical findings in Chapter Five, the specific hypotheses are now tested for statistical significance.

#### **6.1. HYPOTHESIS ONE: ANNUAL UNEXPECTED EARNINGS ARE POSITIVELY CORRELATED WITH ABNORMAL SHARE RETURNS**

A chi-square test of association and one-tail t-tests were performed to assess the relationship between annual earnings and share returns over the pre-announcement period.

##### **6.1.1. Chi-square test of association**

The chi-square test was performed to determine whether a significant association exists between the sign of unexpected earnings (positive or negative) and the sign of abnormal returns over the pre-announcement period. The null and alternative hypotheses for this test are as follows:

$H_0$ : the sign of unexpected headline EPS and the sign of AHPR are independent

$H_1$ : the sign of AHPR is associated with the sign of unexpected headline EPS

Using AHPR [-195,-1], the chi-square statistic was calculated as 19.81, indicating that the null hypothesis of independence can be rejected at the 0.01% level of significance. This indicates that the sign of the AHPR (positive or negative) over the nine month period leading up to an earnings announcement is highly associated with the sign of the unexpected headline EPS (good news or bad news). This conclusion is consistent with the theory that a substantial portion of information causing investors to revise their share valuations is being captured in the annual earnings figure.

##### **6.1.2. One-tail t-tests**

Good and bad news portfolios were formed on the basis of unexpected headline EPS, using the analyst nine-month EPS forecast as expected earnings. One-tail t-tests were then conducted on the AHPRs of the 'good news' and 'bad news' portfolios to

determine whether their mean AHPRs are significantly greater than or less than zero respectively.

<b>TABLE 7</b>		
<b>One-tail t-tests of AHPR [-195,-1]</b>		
	<b>Good News</b>	<b>Bad News</b>
Sample size	122	148
Mean AHPR	9.58%	-6.94%
t-statistic	3.73	-3.18
p-value	0.0001	0.0009
Significance level	very highly significant	very highly significant

The results indicate that 'good news' shares exhibit significantly positive abnormal returns and 'bad news' shares significantly negative abnormal returns over the 195 trading days leading up to the earnings announcement.

A shortcoming of this t-test, however, is that the abnormal return of the total sample over this period is not equal to zero – the total sample generates an AHPR [-195,-1] of 0.53%. The argument can therefore be made that the portfolio AHPRs should be tested against 0.53% rather than zero. This would create statistical problems, though, because a substantial portion of observations making up the total sample is contained in the good and bad news portfolios. Testing the means against zero is also not problematic, since the total sample is still expected to generate a zero AHPR, and 0.53% does not appear to be materially different from this.

The problem can be avoided by simply testing whether the AHPR of the 'good news' portfolio is significantly greater than that of the 'bad news' portfolio. However, since the AHPRs of the 'good news' and 'bad news' portfolios are already found to be significantly greater than and less than zero respectively, this conclusion can be drawn.

Based on the chi-square test and t-tests conducted, it can therefore be concluded that a positive correlation does exist between the sign of annual unexpected earnings and abnormal share returns.

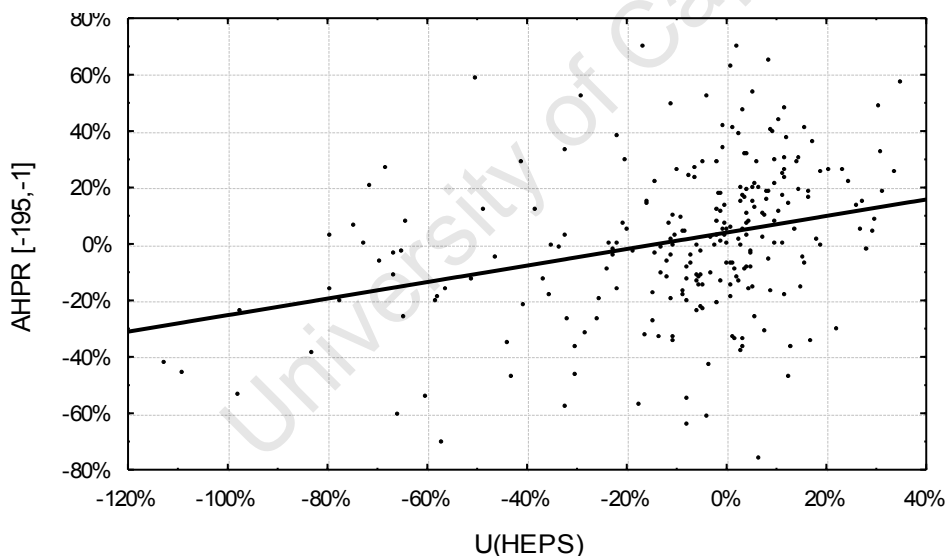
## 6.2. HYPOTHESIS TWO: THE SIZE OF UNEXPECTED EARNINGS IS POSITIVELY CORRELATED WITH THE MAGNITUDE OF ABNORMAL SHARE RETURNS OVER THE YEAR LEADING UP TO ANNOUNCEMENT

In testing this hypothesis, one method is to group the total sample of 270 observations into quintiles based on the size of unexpected earnings and to then observe whether the quintiles are perfectly ranked by their abnormal returns over the pre-announcement period. This analysis, performed and discussed in Chapter Five, found the quintiles to be perfectly ranked by their abnormal returns, supporting the hypothesis that the size of unexpected earnings is in fact positively correlated to the magnitude of abnormal share returns. A second method of testing for this correlation involves performing an ordinary least squares regression analysis. This method tests for a significant linear relationship between AHPRs and unexpected HEPS (headline EPS). The relationship is illustrated in figure 16 below.

Figure 16: Regression line of AHPR [-195,-1] against U(HEPS)

$$\text{AHPR} [-195,-1] = 0.0407 + 0.2928 * \text{U(HEPS)}$$

$$R^2 = 0.113 \quad (t=2.27) \quad (t=5.61)$$



In performing the regression, the data points with the ten highest and ten lowest percentage unexpected HEPS were omitted to prevent outliers from distorting the results. The independent variable U(HEPS) (unexpected headline EPS) was then tested for significance and the following results were obtained:

<b>TABLE 8</b>	
<b>Significance of U(HEPS) regression coefficient</b>	
Sample size	250
Coefficient	0.29
t-statistic	5.61
p-value	<0.0001
Significance level	very highly significant

The one-tail test reveals the U(HEPS) coefficient to be very highly significantly greater than zero. The same test was also performed on all 270 data points and a p-value of 0.0001 was obtained, also very highly significant.

It can therefore be concluded that a significant positive relationship does exist between the size of unexpected HEPS and the magnitude of abnormal returns. The implication of this finding is that more material price-sensitive information released over the pre-announcement period is captured in earnings through incrementally larger adjustments.

### **6.3. HYPOTHESIS THREE: THE ANNUAL EARNINGS ANNOUNCEMENT CONTAINS NEW INFORMATION**

To test whether the earnings announcement conveys new information to the market, the AHPRs are analysed from two trading days before the announcement date (to take possible information leakage into account) until two trading days after (to allow time for the initial market reaction). Good and bad news portfolios were formed on the basis of unexpected headline EPS, using the analyst one-month EPS forecast as expected earnings. One-tail t-tests were conducted on the AHPRs of the 'good news' and 'bad news' samples to determine whether their mean AHPRs are significantly greater than or less than zero respectively.

<b>TABLE 9</b>		
<b>One-tail t-tests of AHPR [-2,+2]</b>		
	<b>Good News</b>	<b>Bad News</b>
Sample size	161	109
Mean AHPR	4.03%	-1.12%
t-statistic	6.59	-1.70
p-value	<0.0001	0.0464
Significance level	very highly significant	significant

The results indicate that the unexpected component of earnings does cause share prices to change materially. When earnings exceed expectations, a significant positive abnormal share return is observed and vice versa for when earnings fall below expectations. The implication is that the annual earnings announcement does contain a degree of timely, new information.

The results also show the reaction to be asymmetrical – a ‘good news’ announcement causes a larger share price reaction than a ‘bad news’ announcement. This provides support for the conclusion that the South African market appears to be pessimistic in its earnings expectations. Bad news is impounded into the share price to a larger extent than good news, causing larger reactions to good news announcements than to bad news announcements.

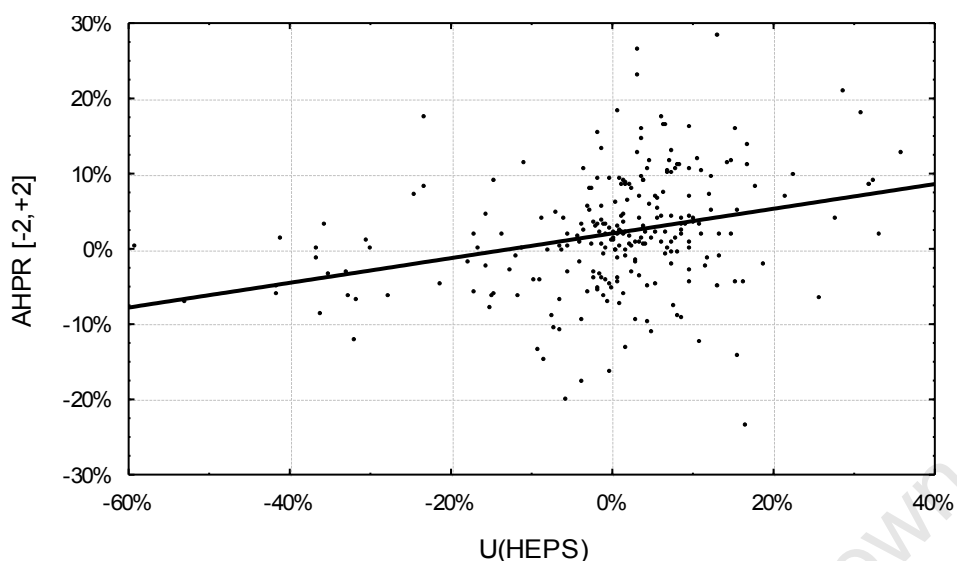
#### **6.4. HYPOTHESIS FOUR: THE SIZE OF UNEXPECTED EARNINGS IS POSITIVELY CORRELATED WITH THE MAGNITUDE OF SHARE RETURNS IN THE DAYS AROUND THE ANNOUNCEMENT**

As with the association study, two different methods can be used to test the relationship between the size of unexpected HEPS and the magnitude of AHPRs. The first method, involving grouping the total sample of observations into quintiles based on the size of unexpected earnings, revealed the quintiles to be perfectly ranked by the size of their abnormal returns. The second method of linear regression analysis is now conducted. To remove the effect of outliers distorting this relationship, the top and bottom ten data points ranked in terms of unexpected HEPS were once again excluded from the analysis.

**Figure 17: Regression line of AHPR [-2,+2] against U(HEPS)**

$$\text{AHPR} [-2,+2] = 0.0205 + 0.1641 * \text{U(HEPS)}$$

$$R^2 = 0.087 \quad (t=4.35) \quad (t=4.85)$$



In testing the independent variable U(HEPS) for significance, the following results were obtained:

<b>TABLE 10</b>	
<b>Significance of U(HEPS) regression coefficient</b>	
Sample size	250
Coefficient	0.164
t-statistic	4.85
p-value	<0.0001
Significance level	very highly significant

The U(HEPS) coefficient is found to be very highly significantly greater than zero. Based on both the quintile analysis and regression analysis, the conclusion can therefore be drawn that the earnings announcement does convey incremental new information to the market – the larger the unexpected earnings, the greater the information content (seen through larger abnormal share returns).

## **6.5. HYPOTHESIS FIVE: ABNORMAL SHARE RETURNS ARE NOT EARNED AFTER ONE WEEK FOLLOWING THE ANNOUNCEMENT**

If the JSE is semi-strong form efficient, share prices should adjust immediately to the new information contained in earnings announcements. The new information should have been impounded into the share price within a week of the announcement, with the result that abnormal share returns should not be observed thereafter.

### **6.5.1. Chi-square test of association**

This test shows whether any association exists between the sign of AHPR and the sign of unexpected HEPS. An association would indicate the presence of post-announcement drift in share returns and therefore inefficiency in the stock market. Ball and Brown (1968) were the first to test for the presence of post-announcement drift by using the chi-square test.

<b>TABLE 11</b>		
<b>Chi-square test of association between sign of unexpected HEPS and sign of AHPR</b>		
<b>Trading days after announcement</b>	<b>Chi-square statistic</b>	<b>p-value</b>
1-10	0.63	0.4278
11-20	0.69	0.4069
21-30	0.74	0.3882
31-40	1.97	0.1600
41-50	1.72	0.1902
51-60	1.14	0.2867

From table 11 above it appears that no significant association exists between the two variables. This lack of association is consistent with the JSE being semi-strong form efficient as post-announcement share price drift is not observed. However, since the chi-square test is not a powerful test, further statistical tests have been conducted.

### **6.5.2. Regression analysis**

Unexpected HEPS was regressed against AHPRs for three different holding periods (from five, ten and twenty trading days after announcement to day sixty). The U(HEPS) coefficient was then tested for being significantly different from zero to determine whether a correlation exists between U(HEPS) and AHPRs. Once again, the top and

bottom ten data points ranked in terms of unexpected HEPS were excluded from the analysis to remove potential distortion of results by outliers.

<b>TABLE 12</b>			
<b>Significance of U(HEPS) regression coefficient</b>			
	<b>AHPR[+5,+60]</b>	<b>AHPR[+10,+60]</b>	<b>AHPR[+20,+60]</b>
Sample size	250	250	250
Coefficient	0.012	0.033	-0.051
t-statistic	0.18	0.53	-0.83
p-value	0.8580	0.5956	0.4071
Significance level	not significant	not significant	not significant

The results are consistent with that of the chi-square test of association – no significant relationship appears to exist between unexpected HEPS and abnormal returns from five trading days beyond announcement, indicating that the market is efficient in this respect.

#### **6.5.3. Two tail t-tests of mean AHPRs against zero**

Over the post-announcement period, the total sample AHPR is found to differ substantially from zero. This is illustrated in figure 14 on page 64. For the total sample, the AHPR [+5,+60] is 2.89%, the AHPR [+10,+60] is 1.93% and the AHPR [+20,+60] is 1.81%. These returns all appear to be significantly positive, with the result that the abnormal returns of both the good and bad news portfolios have an upward bias. It would therefore be of limited value to test whether the good and bad news portfolio mean post-announcement AHPRs are significantly different from zero. The t-tests were still performed though, the results of which are contained in Appendix T.

#### **6.5.4. One-tail t-test for matched pairs (Good News and Bad News AHPRs)**

To circumvent the problem of the upward bias in the total sample's mean post-announcement AHPRs, a t-test for matched pairs was conducted to determine whether the mean post-announcement AHPRs of the 'good news' portfolio are significantly greater than that of the 'bad news' portfolio. Once again, good and bad news portfolios were formed based on unexpected headline EPS using the analyst one-month EPS forecast as expected earnings. Cumulative returns from 5 days after announcement to 30 days after announcement were used. The results are summarised in table 13.



<b>TABLE 13</b> <b>One-tail t-test for Matched Pairs (Good News and Bad News post-announcement AHPRs)</b>	
<b>AHPR[+5,+30]</b>	
Sample size	26
Mean difference	0.940%
t-statistic	5.01
p-value (one-tail)	p<0.0001
Significance level	Very highly significant

The results clearly indicate that the mean AHPRs of the 'good news' portfolio over the period [+5,+30] are very significantly greater than those of the 'bad news' portfolio. This finding provides confirmation of post-announcement drift – the abnormal returns of the portfolio diverge beyond the announcement date, an indication of market inefficiency.

## **6.6. HYPOTHESIS SIX: HEADLINE EPS IS SIGNIFICANTLY MORE CORRELATED TO SHARE RETURNS THAN BASIC EPS**

As discussed in Chapter Four, valuation theories posit that the intrinsic value of a share equals the present value of future expected cash flows. Since headline earnings excludes items of a capital nature, it is closer than basic earnings to maintainable earnings expected in future years. Also, headline earnings is widely used by analysts in company valuations. It is therefore hypothesised that share returns are more closely correlated to headline EPS than to basic EPS.

### **6.6.1. One-tail t-tests of mean AHPRs against zero**

A preliminary comparison of the two earnings measures is made by dividing the total sample into 'good news' and 'bad news' portfolios based firstly on headline EPS (HEPS) and secondly on basic EPS (BEPS). One-tail t-tests are then conducted on the AHPRs of the 'good news' and 'bad news' portfolios to ascertain whether their mean returns are significantly greater than or less than zero respectively. In all cases, analyst EPS forecasts are used as expected earnings. The results are summarised in table 14 below.

TABLE 14 Summary of Mean AHPRs for HEPS and BEPS								
	AHPR[-195,-1]				AHPR[-2,+2]			
	Good News		Bad News		Good News		Bad News	
	HEPS	BEPS	HEPS	BEPS	HEPS	BEPS	HEPS	BEPS
Sample size	122	119	148	151	161	140	109	130
Mean AHPR	9.58%	9.43%	-6.94%	-6.49%	4.03%	2.98%	-1.12%	-0.38%
t-statistic	3.73	3.58	-3.18	-3.01	6.59	4.51	-1.70	-0.61
p-value	0.0001	0.0002	0.0009	0.0015	<0.0001	<0.0001	0.0464	0.2723

In all cases, the mean AHPR is greater in absolute terms using HEPS than BEPS, indicating that HEPS is more correlated to abnormal share returns than BEPS. To determine whether the differences between their mean returns are significant, one-tail t-tests for matched pairs were conducted. The results of these tests, summarised in table 15 below, show that in all cases, the AHPR is significantly greater in absolute terms using HEPS than BEPS.

TABLE 15 One-tail t-tests for Matched Pairs (HEPS and BEPS abnormal returns)				
	AHPR[-195,-1]		AHPR[-2,+2]	
	Good News	Bad News	Good News	Bad News
Sample size	195	195	5	5
Mean difference	0.058%	0.107%	1.056%	0.493%
t-statistic	3.58	7.70	33.93	5.17
p-value (one-tail)	0.0002	<0.0001	<0.0001	0.0033

It is therefore concluded that headline EPS is more positively correlated to abnormal returns than basic EPS.

### 6.6.2. Regression analysis

The regression analysis compares the two earnings measures from a slightly different perspective, by examining whether unexpected earnings based on HEPS and on BEPS exhibit a positive linear correlation with AHPRs.

The following results are obtained from testing the U(EPS) regression coefficient for significance in explaining AHPRs:

<b>TABLE 16</b>				
<b>Significance of U(EPS) regression coefficient</b>				
	<b>AHPR[-195,-1]</b>		<b>AHPR[-2,+2]</b>	
	<b>HEPS</b>	<b>BEPS</b>	<b>HEPS</b>	<b>BEPS</b>
Sample size	250	250	250	250
Coefficient	0.29	-0.002	0.164	0.015
t-statistic	5.61	-0.07	4.85	1.52
p-value	<0.0001	0.4717	<0.0001	0.0650
Significance level	very highly sig.	not significant	very highly sig.	nearly sig.

When unexpected earnings are based on headline EPS, the regression coefficient is very highly significantly greater than zero, indicating a strong positive relationship with abnormal returns. However, no significant relationship was found between basic EPS and abnormal returns.

The conclusion is therefore reached that the market uses headline EPS and not basic EPS to value shares.

#### **6.7. HYPOTHESIS SEVEN: ANALYST EPS FORECASTS SERVE AS A BETTER MODEL OF EXPECTED EARNINGS THAN PRIOR-YEAR EPS**

In forecasting expected earnings, analysts have access to a wider range of information than simply prior-year earnings. Added to this, they also have a timing advantage in that they are able to incorporate more recent information since the last annual earnings announcement into their forecasts. It is therefore hypothesised that analyst forecasts are a more accurate measure of expectations than prior-year earnings.

##### **6.7.1. Comparison of one-tail t-tests of mean AHPRs against zero**

Using headline EPS as the earnings measure, the total sample is divided into 'good news' and 'bad news' portfolios based on the two different earnings expectation models. One-tail t-tests are then conducted on the AHPRs of these 'good news' and 'bad news' portfolios to ascertain whether their mean returns are significantly greater than or less than zero respectively. The results are summarised in table 17 below.

TABLE 17 Mean AHPRs for Analyst and Random-walk Forecast HEPS Models								
	AHPR[-195,-1]				AHPR[-2,+2]			
	Good News		Bad News		Good News		Bad News	
	Analyst	Random walk	Analyst	Random walk	Analyst	Random walk	Analyst	Random walk
Sample size	122	189	148	81	161	189	109	81
Mean AHPR	9.58%	4.13%	-6.94%	-7.89%	4.03%	-1.79%	-1.12%	0.47%
t-statistic	3.73	2.05	-3.18	-2.44	6.59	-0.42	-1.70	0.50
p-value	0.0001	0.0207	0.0009	0.0084	<0.0001	0.3357	0.0464	0.3097

The p-values indicate that in all scenarios examined, the abnormal returns based on the analyst forecast model are found to be more significantly different to zero than the abnormal returns based on the random-walk model. This implies that abnormal share returns are more closely correlated to unexpected earnings based on analyst forecasts. Since the market reaction is more correlated to unexpected analyst forecasts, it can be concluded that analyst forecasts serve as a better earnings expectation model than the random-walk model.

#### 6.7.2. Regression analysis

The unexpected headline EPS is dependent on the earnings expectation model. Regression analysis is therefore conducted on the U(HEPS) coefficients based on the two different earnings expectation models to ascertain the strength of the correlation between the size of unexpected earnings and the size of abnormal returns.

TABLE 18 Significance of U(HEPS) regression coefficient				
	AHPR[-195,-1]		AHPR[-2,+2]	
	Analyst	Random-walk	Analyst	Random-walk
Sample size	250	250	250	250
Coefficient	0.29	0.062	0.164	-0.01
t-statistic	5.61	3.24	4.85	-0.11
p-value	<0.0001	0.0007	<0.0001	0.4561
Significance level	very highly sig.	very highly sig.	very highly sig.	not sig.

As expected, analyst forecast earnings are more highly correlated with abnormal returns than random-walk earnings.

Nine months before the announcement both earnings expectation models are still, however, very highly significantly correlated with abnormal returns. However, analyst

forecasts in the month of the announcement are observed to be a materially better model of expected earnings than simply using prior year earnings. This is expected because the analysts' timing advantage improves as time passes and the remaining time horizon of the forecast shortens. In making the one-month EPS forecast, analysts are able to incorporate new information that has become available over the last eleven months since the last earnings announcement, including the interim results published midway through the year. With this larger body of information, analysts are able to adjust prior-year earnings so as to produce more accurate forecasts of earnings in the coming announcement.

It is thus concluded that analyst forecasts are a better expectation of earnings than prior-year earnings.

## **6.8. SUMMARY OF FINDINGS**

The results of the hypotheses tested in this chapter are summarised below:

- A significant positive correlation exists between the sign of annual unexpected earnings and abnormal share returns over the nine month period leading up to the earnings announcement. This is consistent with the theory that a substantial portion of information causing investors to revise their share valuations is being captured in the annual earnings figure.
- A significant positive relationship exists between the size of unexpected headline EPS and the magnitude of abnormal share returns over the nine month period leading up to the earnings announcement. The implication is that more material price-sensitive information released over the pre-announcement period is captured in earnings through incrementally larger adjustments.
- The unexpected component of earnings does cause share prices to change significantly. When earnings exceed expectations, a significant positive abnormal share return is observed and vice versa for when earnings fall below expectations. The implication is that the annual earnings announcement does contain a degree of timely, new information. The results also show the reaction to be asymmetrical – a 'good news' announcement causes a larger share price reaction than a 'bad news'

announcement. This provides support for the conclusion that the South African market appears to be pessimistic in its earnings expectations.

- A significant positive relationship exists between the size of unexpected earnings and the magnitude of abnormal share returns in the days around the earnings announcement. The implication is that the greater the information content of the earnings announcement (measured by the size of unexpected earnings), the larger the share price revision.
- The mean abnormal return of the 'good news' portfolio is significantly greater than that of the 'bad news' portfolio. This finding confirms the presence of post-announcement drift – the abnormal returns diverge beyond the announcement date, an indication of market inefficiency.
- Headline EPS is significantly more positively correlated to share returns than basic EPS. The implication is that the market uses headline EPS and not basic EPS to value shares.
- Abnormal share returns are more closely correlated to unexpected earnings based on analyst forecasts than based on prior-year earnings. Since the market reaction is more correlated to unexpected analyst forecasts, this implies that analyst forecasts serve as a better earnings expectation model than prior-year earnings. Furthermore, the analyst forecast model is found to improve significantly relative to prior-year earnings as an earnings expectation model over the course of the year. This is consistent with analysts being able to use more recent company-specific information as it becomes available over to adjust expected earnings appropriately.

Based on the findings of the empirical research discussed in Chapter Five and the results of the hypothesis testing in this chapter, conclusions regarding the relationship between annual earnings and share returns on the JSE can now be drawn. These conclusions are discussed in the following chapter.

# **CHAPTER SEVEN**

## **CONCLUSIONS**

Based on the findings of this report, the following conclusions may be drawn:

### **7.1. ACCOUNTING EARNINGS DISCLOSURES IN SOUTH AFRICA HAVE SIGNIFICANT INFORMATION CONTENT**

The characteristics of the JSE are substantially different to the NYSE. The JSE is substantially smaller in size, resulting in lower liquidity and efficiency. The dominant industries listed on the exchanges and the accounting disclosure requirements also differ considerably. Despite these differences, the findings show the relationship between annual earnings and share returns on the JSE to be consistent with the relationship observed on the NYSE. The findings of this study provide empirical evidence that accounting earnings disclosures in South Africa have significant information content.

#### **7.1.1. Accounting earnings do capture a substantial portion of the information reflected in share returns**

The positive correlation between the sign of unexpected earnings ('good news' versus 'bad news') and abnormal share returns over the nine months leading up to the earnings announcement provides evidence that at least part of the information about a company affecting its share returns is captured in its annual earnings. Furthermore, the fact that the *size* of unexpected earnings is also positively correlated to the *magnitude* of abnormal share returns reinforces this conclusion. This indicates that more significant price-sensitive information released over the period (reflected through larger abnormal share returns) is captured through larger changes in earnings. The implication is that accounting earnings does have significant information content, without reference to whether this information is timely or not. The information content of earnings disclosures indicates that the method used by accountants to calculate earnings effectively takes into account relevant information affecting company value.

### **7.1.2. The annual earnings announcement is not a particularly timely source of information**

The empirical findings indicate that 85% to 98% of the share return reaction occurs prior to the announcement date. This indicates that although the annual earnings figure has significant information content, it is not a timely source of information. It appears that the market uses other more timely sources of information to forecast the future prospects of companies.

### **7.1.3. The annual earnings announcement event conveys incremental new information to the market**

The unexpected component of annual earnings conveys new information to the market that causes investors to revise their share valuations. A positive correlation exists between the size of unexpected earnings and the magnitude of share returns. This is consistent with the argument that the larger the unexpected component of earnings, the greater the impact on share valuations, evidenced through larger share price revisions immediately after announcement.

### **7.2. SHARES ON THE JSE ARE VALUED USING HEADLINE EPS AND NOT BASIC EPS**

A strong positive correlation exists between abnormal returns on the JSE and unexpected headline EPS. However, no significant correlation is found when basic EPS is used as the earnings measure. This implies that investors revise their share valuations based on unexpected changes in headline EPS rather than basic EPS. It is therefore concluded that headline EPS is the earnings measure used by the market to value shares on the JSE.

### **7.3. ANALYSTS ARE SUCCESSFULLY ABLE TO INCORPORATE NEW INFORMATION INTO FORECASTS OF ANNUAL EARNINGS**

Consistent with prior studies, the findings show analyst forecasts to be a more accurate measure of expectations than prior-year earnings. This is explained by the fact that analysts are successfully able to use more recent company-specific information as it becomes available during the course of the year to adjust expected earnings appropriately. Consistent with this logic, it is observed that the divergence



between the two earnings expectation models increases as time passes and the announcement date nears. Nine months before announcement, the correlation between abnormal returns and unexpected earnings is only marginally stronger with the analyst forecast model. However, within the month of announcement, the correlation remains highly significant using the analyst forecast model but completely insignificant using the random-walk model.

#### **7.4. THE JSE IS NOT COMPLETELY EFFICIENT**

In an efficient market, new information affecting share value is impounded into share prices immediately. As a result, abnormal returns cannot be generated in the period thereafter. This study finds situations where the full share price adjustment does not occur immediately, indicating that the market is not completely efficient.

##### **7.4.1. Some post-announcement drift in share returns is evident on the JSE**

The study finds evidence of post-announcement drift in share returns on the JSE. The chi-square test reveals no association between the sign of unexpected earnings and the sign of abnormal returns, and regression analysis reveals no linear correlation between the size of unexpected earnings and the magnitude of abnormal returns. However, contrary to the semi-strong form of efficiency, the mean post-announcement AHPRs of the good and bad news portfolios are found to diverge from each other, even a week beyond the announcement date. This should not occur in a perfectly efficient market, and it therefore provides evidence of post-announcement drift in share returns.

##### **7.4.2. The market appears to be pessimistic in its earnings expectations**

The share price reaction to unexpected earnings is found to be asymmetrical, with a 'good news' announcement causing a larger share price reaction than a 'bad news' announcement. This is observed through the 'good news' portfolio generating an AHPR [-2,+2] that is larger in magnitude than that of the 'bad news' portfolio. Furthermore, the pre-announcement abnormal returns of the 'good news' portfolio make up a substantially smaller percentage of the total abnormal returns (AHPR[-195,+2] ) than that of the 'bad news' portfolio.

It appears that the market is pessimistic in its earnings expectations. 'Bad news' is impounded into the share price before the announcement, with the result that a minimal share reaction occurs when the expected bad news is validated by the announcement. On the other hand, a large positive reaction is observed at the time of a 'good news' announcement, indicating that the market requires 'hard evidence' of good news before adjusting share prices upwards. The reaction is therefore asymmetrical because bad news is impounded into share prices to a larger degree than good news. This observation indicates inefficiency on the JSE.

The confidence in this conclusion is strengthened by the fact that the asymmetrical share return movements are observed over a relatively short period of several days. As a result, the impact of measurement biases in the calculation of abnormal returns is minimised, as suggested by Fama (1991).

One possible reason for this apparent pessimism is that negative publicity (such as a strike) is often more easily observable and tends to receive more attention in the financial press than positive publicity. Positive news, such as growth in market share or sales, is by its nature less easily observable before financial results are published.

## **7.5. ADDITIONAL OBSERVATIONS ON THE RELATIONSHIP BETWEEN EARNINGS AND SHARE RETURNS ON THE JSE**

In observing the relationship between earnings and share returns, some additional observations were made which provide a more detailed understanding of the relationship that exists on the JSE. The following conclusions were drawn from these observations:

### **7.5.1. The market takes more interest in companies close to their annual earnings announcement**

It is observed that the magnitude of share return movements increases in the month prior to the annual earnings announcement. This finding is consistent with the logic that the market starts to take a keener interest in predicting company performance over the past year as the announcement date nears. Being the medium through which the company reports to the public on its past performance, the annual earnings announcement is an important event in the company's calendar. This information is used by investors to revise their share valuations based on the expected future

prospects of the company. It is therefore not surprising to observe increased share activity in the period leading up to this important event.

#### **7.5.2. Significant share reactions in the days before announcement suggest information leakage or legitimate market anticipation**

The empirical evidence shows significant share reactions to occur just before the annual earnings announcement, and the reaction is positive for good news surprises and negative for bad news surprises. Since this reaction prior to the official announcement is in the expected direction based on the earnings surprises, this provides evidence that the market receives reliable earnings information prior to the official announcement. This indicates either that a degree of information leakage and insider trading occurs on the JSE, or that knowledgeable investors and analysts are correctly able to adjust their expectations of earnings through legitimate information sources such as company analysis and interviews with management.

#### **7.5.3. The interim earnings announcement contains a lower degree of new information than the annual earnings announcement**

In the ten trading day period six months before the annual earnings announcement, at the time when most interim earnings announcements are expected to be made, positive abnormal returns are observed among 'good news' companies and negative abnormal returns among 'bad news' companies. This finding is consistent with the interim announcement conveying a degree of new information to the market. However, the magnitude of the share return reactions is smaller than at the time of the annual earnings announcement, indicating that the interim earnings announcement contains a lower degree of new information than the annual announcement.

## 7.6. CONCLUDING REMARKS AND AREAS FOR FUTURE RESEARCH

This research study investigates whether the relationship between accounting earnings and share returns observed predominantly in NYSE studies also holds on the modern-day JSE. Since the JSE is a relatively small stock exchange in comparison to the NYSE, with substantially different characteristics, the nature of the relationship may differ between the two exchanges.

The study finds empirical evidence that this relationship between earnings and share returns is the same. As on the NYSE, accounting earnings disclosures in South Africa are found to have significant information content. Evidence is obtained which shows that accounting earnings do capture a significant portion of the information reflected in share returns, although they are not a timely source of information. Furthermore, the annual earnings announcement does convey incremental new information to the market.

An important finding of the study is that the market uses headline earnings and not basic earnings to value shares on the JSE. This validates the importance of headline earnings disclosure required by JSE-listed companies.

In addition, the study finds evidence of inefficiency on the JSE. Some post-announcement drift in share returns is observed, and the market appears to be pessimistic in its earnings expectations. The study also shows that analyst forecasts are a more accurate measure of expected earnings than prior-year earnings.

Flowing from this research, the following areas for future research have been identified:

- Using different market proxies to measure abnormal returns. Examples of proxies relevant to the JSE would include the overall market index, dividing the overall market into a resources index, and financial and industrial index, or using specific sector indices (rather than the broad economic groups used in this study). Company betas could also be used to adjust the market proxy to the expected share return. The Financial Risk Service calculates company betas relative to the overall market index as well as to the resources index, and financial and industrial index.

- Removing the effect of dividend announcements occurring simultaneously to earnings announcements. This can be done by removing the observations where this occurs. The problem is that South African companies often declare dividends at the same time as the earnings announcement. The other option would then be to investigate companies that do not declare dividends. Of the top 120 companies on the JSE, 20 do not declare dividends and it is expected that a larger percentage of smaller companies also do not declare dividends.
- Using earnings expectation models other than the analyst forecast or random-walk models. Ball and Brown's (1968) regression model was not used in this study. Other models have also been used, for example, by Foster, Olsen and Shevlin (1984) that may be worth applying.

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